RAILROAD GAZETTE

FRIDAY, MAY 19, 1876.

Contributions.

Rapid Bridge Building.

NEW YORK, May 15, 1876.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your last issue contains a reference to a 100-feet iron deck bridge on the Boston & Albany Railroad which was erected so as to carry one track in nineteen days from the giving of the order for the same, the time consumed in erection being only four days, which is given as an instance showing "beyond dispute that riveted bridges can be completed in as short a space of time as can bridges of any other design."

By reference to your paper of May 1, 1875, it will be seen that a pin-connection double-track deck bridge of 166 feet span, which was unusually heavy owing to the small amount of head room allowed, was swung in just 17 days from the time *the old bridge was destroyed*. It was a double-track bridge, and on the day it was swung it was in proper order to carry both tracks, if the temporary structure adjoining had admitted of laying them. The time consumed in erecting this span was twenty-two working hours, and owing to the rapid current of the river it was impossible to put in trestle work, and the iron bridge was raised with no other false-work than the temporary Howe truss which carried the trains; to do this safely, it became necessary to put together the lighter parts of the truss, hang one pair of eye-bars in each panel of the lower chord, and then put on the top chord and swing the truss *between the passage of two trains*. Not only was this work done in materially quicker time than that used in building the Boston & Albany Railroad bridge, which cannot have weighed more than one-third what this did, but the circumstances were such that any bridge which had to be sustained for a day on the false-works could not possibly have been erected. Justice to the contractors who executed the work so promptly and to the designers of American pin bridges will be the excuse for my troubling you with this letter.

GEO. S. MORISON.

The Unequal Wear of Opposite Rails.

Office Chattanooga Street Railroad Company,
CHATTANOOGA, Tenn., May 9, 1876.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Being an old tracklayer and road master, I read, with interest, the discussion in your valuable *Gazette*, of practical railroad matters, especially that relating to road bed and track. I have noticed many singular peculiarities in the wear of rails, and, in the North, that of the south rail wearing faster than the north rail. But in the South, where the ground does not freeze, such is not the case, proving, satisfactorily, to my mind, that the cause is hard freezing of the ground and earlier thawing out of the south side, being exposed to the sun, thus letting the track down, and not only throwing more weight on the south side, but rendering it uneven and rough, and thus wearing it more rapidly than the north side.

The reason given by your correspondent, J. W. Alsop, in the *Gazette* of 28th April, is altogether too far-fetched and thin. He says: "All rails as they come from the rolls are bevelled, and all come out the same way from the mills. One rail is all right to lay on the north side, and the south rails are put in without being turned. Consequently, one rail is laid right with the bevel * * * while the other rail being laid wrong, the high side being in, etc., etc."

Now, I would like to know if all rails *are* bevelled, and come from the mill one way, how does it happen that they always get properly laid on the *north* side, and mixed upon the south side? In the first place, all rails don't come from the rolls bevelled, but the same shape on each side, if properly rolled. In the next place, all rails are not shipped from the mill the same way. I know a mill that ships from both sides, and the rails from one side are turned with the cars on a Y, while those from the other side go straight ahead. Also, how would it be with English rails that come over in ships, and are piled about docks, and all that sort of thing?

Oh, no! that won't do. It is the frost does the mischief, as sure as you live.

A. L. HARRIS.

Testing Inventions.

YATES CITY, Ill., May 6, 1876.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have noticed that there has been considerable said in your paper of late about an experimental bureau and testing new inventions, etc., and one writer who signs his name "Expert," and who is probably an inventor, gives his experience in procuring a test or comparison between an old and light engine and a new and much heavier one, prepared and brought out for the occasion. Now, it would undoubtedly be a great advantage to inventors to have some system adopted by means of which their inventions could be thoroughly tested in a way that would be satisfactory to the parties for whose satisfaction such tests should be made. I am inclined to think that there is a surplus of railroad inventions, and railroad managers do not care to be bothered with experiments made with a view of providing substitutes for what they have on hand and have found to answer the purpose tolerably well, especially as long as they have no personal interest in the matter. In order to show how railroad men treat inventions and inventors, I will relate the following from my own experience: Last Fall I showed a road-master having charge of 500 miles of track a working model of a new rail-joint. Said he, "The great difficulty is, there are so many of these inventions gotten up by men who have had no practical experience in such matters. Now, you think that thing is first-rate, just the thing wanted, and all that sort of thing; but I know better. That thing would be a complete nuisance on account of that centre piece (the most essential part of the device). Why," said he, "I will bet $10 you could not keep it in the track twenty-four hours—no, not even for one good long train to run over it." Now, this was after I had had one placed in the track without his knowledge or consent, and it had been there for three months. I presume it will never be known how many inventors have been bluffed off in a similar manner.

W. H. ROBINSON.

Fast Time on the Fort Wayne Road.

Pennsylvania Company, operating the Pittsburgh, Fort Wayne & Chicago Railway.
MASTER MACHINIST'S OFFICE, WESTERN DIVISION,
FORT WAYNE, Ind., May 6, 1876.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As statements of "fast time" appear to be in order, I send you the time made by engine No. 199 in the fall of 1870; do not think I have seen any record of faster time made since, therefore send it.

The engine was built by the company at their Fort Wayne shops; 16 by 24 in. cylinders, 5 ft. 6 in. drivers. The trains run were neither "specials" nor "extras," but delayed regular trains, having no right to the track other than provided by rules for "delayed trains." The engine at that time was a wood-burner, and had to take wood and water at Plymouth and Wanatah. Eleven stops were made in each of the two first runs and seven in the third. The record of time is a correct copy from the telegraph dispatcher's train record.

JAS. M. BOON.

Performance of Passenger Engine No. 199, on regular Trains, Western Division Pittsburgh, Fort Wayne & Chicago Railway.

Stations.	Time.	Miles.	Minutes.
	a. m.		
Ft. Wayne	11:55½		
	p. m.		
Columbia	12: 5	19.0	19½
	12:20		
Pierceton	12:31	12.0	11
Warsaw	12:41	8.6	10
Bourbon	12:55	13.8	14
Inwood	1:00	4.7	5
Plymouth	1:07	6.0	7
	1:25		
Summit	1:29	3.3	4
	1:37		
Hamlet	1:50	11.5	13
Hanna	2:00	10.0	10
Wanatah	2:09	6.2	8
	2:15		
Valparaiso	2:27	9.2	12
Hobart	2:37	10.5	10
Clarke	2:51	9.5	14
I. C. Crossing	3:06	14.7	15
R. I. Junction	3:10	2.1	4
	3:12		
Boomers	3:17	3.0	5
	3:28		
Archer Ave	3:32	2.2	4
Engine House	3:34	0.3	2
		146.6	2 hrs. 47½ m.
	11 starts.		

No. 1.—Sept. 14, 1870. Engine 199, 1 baggage, 3 coaches.

Stations.	Time.	Miles.	Minutes.
	p. m.		
Plymouth	1:24		
Hamlet	1:41	14.8	17
Hanna	1:51	10.0	10
Wanatah	1:58	6.2	7
	2:06		
Valparaiso	2:17	9.2	11
Hobart	2:27	10.5	10
Clarke	2:41	9.5	14
I. C. Crossing	2:55	14.7	14
R. I. Junction	2:59	2.1	4
Archer Ave	3:05	5.2	6
		82.2	1 hr. 33 min.
	7 starts.		

No. 1.—Oct. 2, 1870. Engine 199, 2 coaches, 1 baggage, 1 palace.

Stations.	Time.	Miles.	Minutes.
	a. m.		
Van Wert	11:23		
Monroeville	11:42	16.6	19
	p. m.		
Ft. Wayne	12:01	15.6	19
	12:08		
Columbia	12:28	19.0	20
	12:36		
Pierceton	12:51	12.0	15
Warsaw	1:00	8.6	9
Bourbon	1:14	13.8	14
Inwood	1:19	4.7	5
Plymouth	1:25	6.0	6
	1:44		
Hamlet	2:01	14.8	17
Hanna	2:13	10.0	12
Wanatah	2:19	6.2	6
	2:26		
Valparaiso	2:37	9.2	11
Hobart	2:48	10.5	11
Clarke	3:03	9.5	15
I. C. Crossing	3:20	14.7	17
R. I. Junction	3:24	2.1	4
Archer Ave	3:32	5.2	8
Engine House	3:34	0.3	2
		178.0	3 hrs. 30 min.
	11 starts.		

No. 1.—Oct. 9, 1870. Engine 199, 1 baggage, 2 coaches, 1 palace.

[The average speed per hour shown by these schedules is:

	Including stops.	Excluding stops.
Sept. 14	40.03 miles.	52.54
Oct. 2	43.35 "	53.03
Oct. 9	43.50 "	51.09

We take this occasion to say that we will be glad to receive other *authenticated* records of unusual speeds. It is not probable that we can publish all the schedules in full; but we can at least give the distances, times, number of starts, length of stops, and average speed; and the authenticated schedules may serve as a foundation of a sort of "racing calendar" of locomotives.—EDITOR RAILROAD GAZETTE.]

Riveted Bridges in America.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Near the end of a translation of a paper written by Mr. Ernest Pontzen, an Austrian engineer, and read before the Austrian Society of Engineers at Vienna, describing the Verrugas Viaduct, a pin-jointed iron structure on the Aroya Railway, in Peru, and comparing the same with riveted structures of a similar character in England and on the Continent of Europe, which appeared in the *Gazette* of the 12th inst., the following statement occurs:

"The railroads of America erect, almost exclusively, such bridges connected by pins, and even such railroads as the New York Central, which used riveted lattice trusses exclusively, have long since begun to adopt the modern American trussed bridge."

This statement, so far as it refers to the New York Central Railroad, is quite incorrect; for this railroad, which began the introduction of riveted iron bridges upon its line about 18 years ago, has never had any other kind built for it.

In 1870 the Hudson River Bridge Company at Albany, which then owned a single-track river bridge over the Hudson River, connecting the New York Central with the Hudson River and the Boston & Albany railroads, decided to build a new double-track iron bridge about half a mile below the old timber structure, and the contract for the superstructure was awarded to Kellogg, Clarke & Co., now the Phœnixville Bridge Company, who erected a very fair example of the pin-jointed system of iron bridges. Very soon after the completion of this bridge the Hudson River Bridge Company decided to replace their timber bridge with a double-track iron bridge, and the contract for constructing it was awarded to Mr. Thomas Leighton, proprietor of the Leighton Bridge & Iron Works at Rochester, who erected a riveted lattice bridge after designs of my own, and I believe that the Hudson River Bridge Company regard this last bridge as in no respect inferior to the one built by the Phœnixville Bridge Company.

Since the completion of these two bridges, the New York Central & Hudson River Railroad Company have expended nearly a million dollars for iron bridges, for the completion of their four tracks and replacing timber bridges, and with these examples of the two systems of iron bridges before their eyes and in constant use by themselves, they, as well as the Boston & Albany Railroad Company, have adopted the riveted system exclusively, and remain, I believe, in blissful unconsciousness of having made any mistake in the matter.

Among the conclusions arrived at by Mr. Pontzen as the result of his comparisons are: (1), that riveted iron bridges are much more costly than pin-jointed bridges; and (2) that it requires much more time to erect the former than the latter.

Whatever the case may be in Europe, the first conclusion will hardly be concurred in by those bridge-builders in this country who have recently competed for iron bridge work with the Leighton Bridge and Iron Works, or the Niagara Bridge Works at Buffalo, who make lattice bridges a specialty.

The second conclusion above mentioned is very opportunely and effectively met by an account, published in the same issue of the *Gazette* with Mr. Pontzen's paper, of the rapid erection of a riveted iron bridge by the Leighton Bridge & Iron Works for the Boston & Albany Railroad Company.

CHAS. HILTON.

Inventors and Managers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your paper of April 21 contains a letter over the signature of "Expert," seemingly commendatory of the idea of a "Bureau of Experimental Research;" but the casual reader forgets all about its heading and gets the impression that the writer is a much-abused man, and that the various railroad officials with whom he has come in contact are not as well qualified to fill their places as they should be. Perhaps a little thought would do away with this impression, or at least modify it.

It is true that all men do not and will not think alike, even when considering the same evidence and under seemingly similar circumstances. Is it a wonder, then, that when seen from varying standpoints, results wide apart are reached?

The man who sees Niagara only in summer may compare notes with him who has seen it in winter only, and while both admit the grandeur of the scene, only one remembers the masses of ice he saw, and there is much variance in the effect on their minds.

So, regarding any supposed improvement, the inventor may feel sure that he can improve an engine or other piece of machinery, and obtain better results than he sees in those machines about him. He has spent much time and mind power on the subject, or on his side of the subject; for there are almost always two sides. He says to the manager: Use my improvement and save 10 per cent. of your fuel, your oil, or do 10 per cent. more work. He is astonished that the manager does not jump at the chance for so large a saving; but he has not figured out how much such a change would cost and what is of more importance, how expensive it will be to maintain. Often—very often—the extra cost of maintenance would be greater than the saving.

Very likely the manager may have covered the same ground by experiments, and found out just where the weak point is, that the supposed gain is infinitely small, or a negative quantity.

He may not care to explain all this in detail to the inventor, and probably has not time if he had the will. Probably, moreover, if he did the inventor would not admit that such was the fact.

Again, our railroad manager may have a road not blessed with a surplus in the treasury; and there are many in our country so situated.

He has an outfit that he knows is imperfect, far from being the best. If he had some other things, or some things in other shapes, he would be able to work with much more economy. Alas! he has not the funds to make the needed changes, or procure the needed machinery. He must handle his coal by hand because he has no money with which to put in more modern methods. He must let his engines stand out doors during the cold winter nights for want of means to build a shelter. He must even get his supplies "from hand to mouth," for the same reason.

Our enthusiastic friend might call this stupid, and think that such a manager should retire, yet I fear he, in the same seat, would do no better.

Did "Expert" ever spend a week at any manager's headquarters and see how thick and fast the inventors dropped in, and how sure each is that he has the *ne plus ultra* of its kind?

They, as a rule, have not learned to condense many ideas into a few sentences, but each must spin out his yarn to a wonderful length, not thinking that our manager has other important matters waiting.

His ideas must be concurred in, his model pronounced perfect, and arrangements made to put in use his invention, or he sees a lack in our manager of something important.

Devices enough are often presented in the course of a few months to save (if the word of the inventor or presenter can be relied upon) considerably more than the whole expense of operating, that is, they would enable you to run the road for nothing and have funds over.

Our manager has much to contend with in this way that each one seeking to introduce a supposed improvement thinks little of. He should have patience to listen reasonably to the inventor, and judgment enough to discover how much good there is in the subject presented, and at what cost it is obtained, and lastly *nerve* enough to say *no*, if in his judgment, for *any* reason, it is best not to try the experiment.

If an experiment is made, it should be fairly done, and an effort made for a correct result, regardless of personal interests. Did "Expert" ever consider the subject in this light?

The "Experimental Bureau" would be an excellent thing, but it does not follow that the results of experiments would be followed largely by the roads of the country. The same reasons that prevent the adoption of many things now would be in force with such a "Bureau."

As an instance, wooden wheels might do well on the seaboard and be pronounced better than the cast iron, but it would be hard to induce the Union Pacific road, with its dry mountain air, to use them.

A certain amount of heating surface in a locomotive may be pronounced just the thing in the hills of New England, but upon our Western prairies, with strong, cold winds, steam could not be kept up with it.

So with many other things: the place and circumstances under which the device is to be used must be known before one can decide whether it is or is not desirable. These circumstances the manager should know; as a rule, the inventor is not so well informed upon these subjects.

I do not undervalue the "theoretical," it is of the utmost importance, but it must be tempered with a little of the "practical," in order to fit well into this practical world. H. C.

April 28, 1876.

Baldwin Locomotives at the Exhibition.

We illustrate on this page two of the locomotives belonging to the exhibit of the Baldwin Locomotive Works, of Philadelphia, at the International Exhibition. The specifications of the locomotives are as follows:

"CONSOLIDATION" ENGINE.

Freight locomotive, "Consolidation" pattern, for the Lehigh Valley Railroad, 4 ft. 8½ in. gauge. Fuel, anthracite coal.

Cylinders.

	Feet.	Inches.
Diameter	1	8
Stroke of piston	2	..
Length of steam ports	1	4
Width of "	..	1½
" exhaust ports	..	2½
Travel of valve	..	6½
Outside lap of valves	..	¾
Inside lap "	..	1-32

Exhaust nozzles double variable.

Wheels.

Diameter of driving-wheels	4	2¾
" truck wheels	2	6
Distance between centers of front and rear driving-wheels	4	9
Total wheel-base of locomotive	22	10
" " " and tender	46	2
Diameter of driving-axle journals	..	7
Length " " "	..	8
Diameter of main crank-pin bearing	..	5
Length " " "	..	5

Boiler.

Outside diameter of smallest ring of boiler	4	6
Thickness of boiler-plates (iron)	..	½
Number of tubes, 198.		
Length "	11	..
Outside diameter of tubes	..	2
Length of fire-box inside	9	10
Width "	2	9¾
Depth " " (sloping)		44⅛ to 55
Thickness of fire-box plates (steel), sides and back	..	5-16
" flue-sheet	..	⅜
" crown-sheet	..	⅜
Square feet of grate surface	27 6-10	..
" heating surface in fire-box	149	..
" " " tubes	1,132	..
Total square feet of heating surface	1,281	..

Weight.

Weight of engine in working order	100,000 lbs.
" " on driving-wheels	88,000 "

REMARKS.

Locomotives of this class have been used on the Lehigh Valley Railroad since 1866, in which year the locomotive "Consolidation," from which the class has taken its name, was built by the Baldwin Locomotive Works, in accordance with the plan and specifications furnished by Mr. Alexander Mitchell, then Master Mechanic of the Mahanoy Division of that line.

On the Wyoming Division of the same railroad, from Sugar Notch to Fairview the grade is 1 in 55 (96 ft. per mile) for 12 miles in length, combined with curves of 8 and 10 degrees radius. The curves are frequent, and there are but two tangents, each less than one mile long, in the whole 12 miles. Up this incline engines of this class can take 40 loaded four-wheeled coal cars. The usual train is 35 such cars, which are taken at a speed of 12 miles per hour. The cars weigh, each, 3 gross tons, 8 cwt., and carry, each, 6 gross tons of coal. The weight of train, therefore, which a "Consolidation" engine takes up the grade, combined with curves as stated, is from 329 to 376 gross tons.

On the Mahanoy Division, over maximum grades of 126 ft. per mile, the maximum load is 35 loaded four-wheeled coal cars (329 gross tons of cars and lading) and the usual load 25 loaded four-wheeled coal cars (235 gross tons of cars and lading). On the same division, over a grade of 76 ft. per mile, one of these engines draws a maximum train of 140 empty four-wheeled cars (476 gross tons) at a speed of 8 miles per hour. It usual train is 100 empty cars (340 gross tons). Compared with the ten-wheeled pattern of locomotive (cylinders, 18x24; driving-wheels, 4 and 4½ feet diameter; weight on driving wheels, about 60,000 lbs.) the performance is as shown in the following table:

	Grade 126 per mile. Gross tons of train.	Grade 76 per mile. Gross tons of train.
Maximum load of "consolidation" locomotive	329	476
" " ten-wheeled locomotive	235	340
Usual load of "consolidation" locomotive	235	340
" " ten-wheeled locomotive	169 to 200	221

Consumption of fuel, "consolidation" engine, 3⅜ tons daily.
" " ten-wheeled " 3¼ " "

The ordinary repairs for a series of years have been one mill per mile greater for the "consolidation" than for the ten-wheeled engine.

"AMERICAN" LOCOMOTIVE.

Passenger locomotive, "American" pattern, for the Central Railroad of New Jersey, 4 ft. 8½ in. gauge. Fuel, anthracite coal.

Cylinders.

	Feet.	Inches.
Diameter	1	5
Stroke of piston	1	10
Length of steamports	1	3
Width " "	..	1¼
" " exhaust ports	..	2½
Travel of valve	..	5½
Outside lap of valves	..	¾
Inside " " "	..	1-32

Exhaust nozzles, single high.

Wheels.

Diameter of driving-wheels	5	2
" " truck-wheels	2	4
Distance between centers of front and rear driving-wheels	8	6
Total wheel-base of locomotive	22	5
" " " and tender	44	2½
Diameter of driving-axle journals	..	7
Length " " "	..	8
Diameter of main crank-pin bearing	..	4½
Length " " "	..	4¼

Boiler.

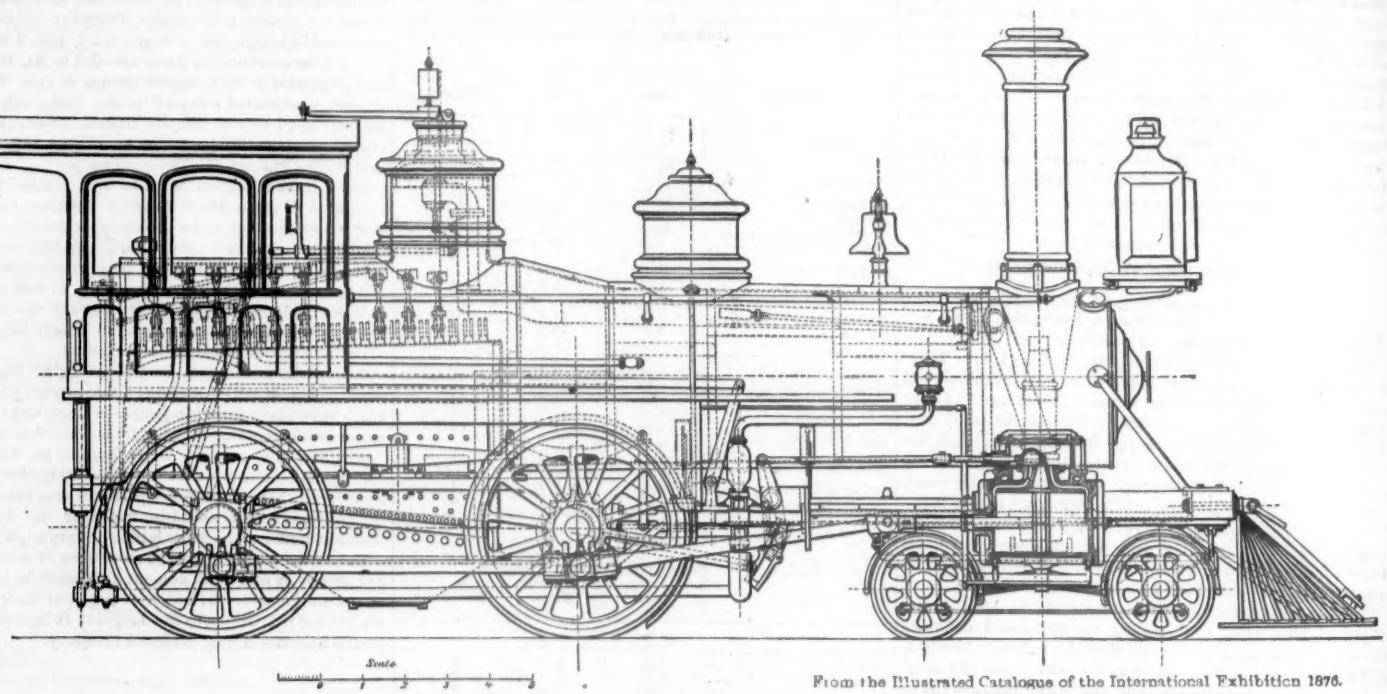
Outside diameter of smallest ring of boiler	4	..
Thickness of boiler plates (steel)	..	⅜
Number of tubes, 163.		
Length " "	11	3
Outside diameter of tubes	..	2
Length of fire-box inside	8	6
Width " "	2	9¾
Depth " " (sloping)		39 to 38
Thickness of fire-box plates (steel) side sheets	..	¼
" " " " back "	..	5-16
" " crown sheets	..	⅜
" " flue sheets	..	⅜
Square feet of grate surface	24	..
" " heating surface in fire-box	112	..
" " " " " tubes	953	..
Total square feet of heating surface	1,065	..

Tender.

Number of wheels, 8.		
Diameter of "	2	6
" " tender-axle journals	..	3½
Length " " "	..	7*
Capacity of tank	3,200 gallons.	

Weight.

Weight of engine in working order	75,000 lbs.
" " on driving-wheels	51,500 "
" " tender, empty	20,500 "



From the Illustrated Catalogue of the International Exhibition 1876.

"AMERICAN" LOCOMOTIVE, BUILT BY THE BALDWIN LOCOMOTIVE WORKS, PHILADELPHIA.

Exhibited at the United States International Exhibition.

April Meeting of the Master Car Builders' Association.

When the members of the association assembled at this meeting, April 27, they found a railroad track nearly the length of the room, upon which stood a locomotive and three cars in miniature, but, it was shown, big enough to run alone. The President said the model was intended to exhibit the invention of Messrs. Richards, of Canada, of a continuous train brake, which would be explained by Mr. B. Giroux, of Quebec, whom he then introduced.

Mr. Giroux said the brake was composed of two distinct features, a brake and a coupler, which if necessary, could be applied separately.

The railroad brake had been a subject of great attention among railroad managers. They want one that will protect life and prevent accidents, and the brake there presented solved the problem. The Richards brake was perfect as a continuous one. It operated in its application from the rear of the train, running back to the locomotive, and is entirely under the control of the engineer. By the use of this device, telescoping, jars and collisions were done away with. The brake was effective in all its parts, and its resistance, or check, was an imperceptible one, gradual, thorough and silent. If a train was suddenly divided, or a part jumped the track, the coupler being automatic in its operation, the separated part would uncouple, the brake would be set, and the whole train would be stopped. In case of an accident in the rear of the train of which the engineer did not know, a brakeman could loosen the lever and put on the hand brake. The connection would be instantly made and the brake put in operation.

The couplers perform two distinct offices, as couplers and as train brake. If an accident happens to any part of the train, causing a car to jump from the track, the coupler performs the function of an engineman in operating the brakes.

Mr. Giroux then called attention to the number of employes killed and injured on railroads, and read the reports of several roads in this country and the reports in England and Germany. He added that if the Richards brake was used these figures would not appear.

The attempts to rob trains, of which we had heard so much of late, would be frustrated. The brake is also operated from front or rear, or in the case of derailing.

The speaker then read an article from a Quebec paper giving an account of a trial made, in which the train, running at a speed of 45 miles an hour, was stopped in from five to six seconds. He also referred to the challenge of Wm. Loughridge in the *Railroad Gazette* of April 21, to which he had responded, offering to have a comparative trial, and had received an answer from Mr. Loughridge, who was glad there was an enemy in the field.

The model locomotive and train were then put on exhibition. The power was compressed air. The train was set in motion, and while running at what was a comparatively high speed the brake was applied and the train stopped in less than a car-length. The rear part of the train was then thrown from the track, and the brake was automatically set and the train stopped.

The chain which operates the brake is continuous throughout the train and is also applied to the driving wheel of the engine, and is connected with the throttle valve on the locomotive, and, when applied, shuts off the steam. The brake can be set so that the train will run any given distance before coming to a full stop. The coupler must be automatic, or the train will not uncouple when off the track. If the train breaks in two, it will be stopped at once. There is an attachment below the car carrying the chain to the rear and back in two gutters, the chain being connected in each car with spiral springs in the gutters, which give elasticity, so that if the car runs off the track there will be no shock.

When asked what would be the expense of applying this brake to a car and locomotive, he answered about $60 or $70 for a car and $150 for a locomotive. These figures, however, were only approximate. He said at the trial on the Grank Trunk Railway, Quebec, the train consisted of three box cars and a baggage car, as well as the tender. It ran 45 miles an hour, and they stopped in 5, 6 and 8 seconds, and, with 137½ pounds of steam on the engine, in 10 and 12 seconds.

Mr. Partridge asked if this was on a straight line.

Mr. Giroux answered that it was on a straight line, level, and that one could not perceive any shock at all. The bumpers never come together until the train stops, and then they come together. In answer to the question how much he estimated the weight of the train to be, Mr. Giroux replied that the cars were not loaded, but the engine was the best express engine they had there.

Mr. Adams asked if he supposed that the train would have stopped as quickly with ten tons in each car.

Mr. Giroux said it would have stopped quicker. They had to fight the locomotive.

Mr. Partridge asked if he had the brake on the driver in that trial.

Mr. Giroux said he had.

Mr. Adams said: Then the brakes on the driving-wheel would stop the train itself.

Mr. Giroux said they would help to stop it.

Mr. Adams asked whether if those cars had had thirty tons in them it would have created a greater momentum at 40 miles an hour than if empty.

Mr. Giroux said it would, but they have more pressure on their brakes with a heavy train.

Mr. Adams asked if it made more pressure on the brakes.

Mr. Giroux said: Yes sir; the more pressure you have, the more power on the brake. Its momentum has power, and the more momentum you have the more power you have.

Mr. Adams said: "The faster the train goes, the more power on the brakes?"

Mr. Giroux: Yes, sir. With a heavy momentum it will stop at the same distance in the same time as with a slow train.

The exhibition being concluded, Mr. Giroux returned thanks to the Association for the courtesy which they had extended to him.

An exhibition of car-couplers was then announced to be in order.

Mr. Crickhair, of Green Bay, Wis., presented a coupler adapted to box, flat and coal cars, which, he said, might be used with the present arrangement of draw bar.

Mr. W. B. Pope, of New York, had a coupler with a reverse hook which would couple with any other car. The buffing was all applied at the end and between the two beams. He had, also, a draw spring, and had a double pressure when buffing.

Mr. C. C. Shelby, of Jersey City, had a coupler and a switch. The former was a draw head with a hook which would enable them to use the same style of draw head. His switch device consisted of a guard rail against the inside of the main line and the inside of the siding rail. When the switch is turned wrong the guard rail of the inside rail of the line falls right over the top of the inside main rail, and the flange of the wheel comes along and opens it, and when the train has passed it returns to its place.

Mr. Ferguson presented a window fastener, consisting of a bar with notches running up the side of the window and a key fastened to the window, by means of which the window could be fastened at any point desired.

Mr. C. A. Smith, Secretary, announced that a proposition had been made by a member of the association who lived in Philadelphia, that the next annual meeting be held in that city instead of New York.

After a brief discussion the proposition was rejected and the meeting adjourned.

MASTER MECHANICS' ASSOCIATION.

Report of the Ninth Annual Convention.

The meeting was held at the appointed time in the hall of the Franklin Institute. About 50 members were present at the opening. After the transaction of the usual preliminary business, including the Treasurer's report, which showed the receipts during the past year to have been $2,146.30 and the amount of the accumulated fund $3,726.77, the report on the "Construction of Locomotive Engines" (published below) was read. The discussion was postponed until next day. The committee consisted of James Sedgley, Lake Shore & Michigan Southern Railway; H. G. Brooks, Brooks Locomotive Works; Howard Fry, Philadelphia & Erie Railroad; W. S. Hudson, Rogers Locomotive Works; S. A. Hodgman, Philadelphia, Wilmington & Baltimore Railroad.

THE CONSTRUCTION OF LOCOMOTIVE ENGINES.

To the American Railway Master Mechanics' Association:

GENTLEMEN: Your committee, to whom was delegated the subject of improvements in locomotive construction, promptly issued a circular embracing inquiries for improvement in:

The form and construction of locomotive boilers with reference particularly to the economy of fuel; valves or machinery for working them; locomotive trucks, spark arrester or smoke consumer; also calling for the results of experience with engines of either Fairlie's or Forney's design, and a general inquiry for *any* improvements in the construction of engines, or parts of engines, of positive value, the knowledge of which would be of value or interest to our fraternity, explaining that the value of the report would depend entirely upon the information received. In answer to this circular but twelve replies have been received, the tenor of which implies but little progress toward the remedy of seeming defects in our present construction, or a general belief that if we cannot achieve perfection, we have at least results very satisfactory at present.

Your committee respectfully report that they are in possession of no information that promises any real improvement in the form or construction of boilers or in valves or machinery for working the latter.

In reference to the construction of locomotive trucks, your committee was favored with a report from Mr. Wells, of the Jeffersonville, Madison and Indianapolis Railroad, submitting a sketch of a device in use by him, with drivers spread 8½ feet; but your committee were not agreed that the sketch submitted was that of new device.

Spark Arresters.—The only information received in reply to our query for a perfect spark arrester is contained in replies from Mr. Coolidge, of the Fitchburg Railroad, and Mr. Hill, of the Camden & Atlantic Railroad.

Mr. Coolidge states that fifteen locomotives in his charge are fitted with what is generally known as the Hawkes & Paine spark arrester and smoke consumer. The style of smoke stack being simple in construction, and in appearance resembling the Griggs or diamond pattern, with the exception that it is larger. The straight part or waist being 21 inches in diameter, and the larger part containing the wire cloth 48 inches in diameter, with an opening at the top of 22 or 24 inches. This spark arrester has what is commonly known as an inside pipe, surmounted by a cone 18 inches in diameter, which operates as a deflector, throwing the sparks or cinders into the space between the inside and outside pipes, from whence they are carried by two short tubes from the base of the smoke stack into two horizontal tubes 3 inches in diameter, placed in the bottom of the boiler, from whence they are carried to the fire-box, which they enter at points immediately under the fire-brick arch. The first spark arrester of the above description commenced service in July, 1872; the other fourteen have been applied at different times since, and though operating very satisfactorily I cannot claim for them perfection.

Mr. Hill, of the Camden & Atlantic, describes his invention in use on that road, and secured by letters patent, as follows: A deflecting plate is arranged in the smoke-box near the flue sheet, so as to cover the top flues, and extending downward toward the bottom of the smoke-box.

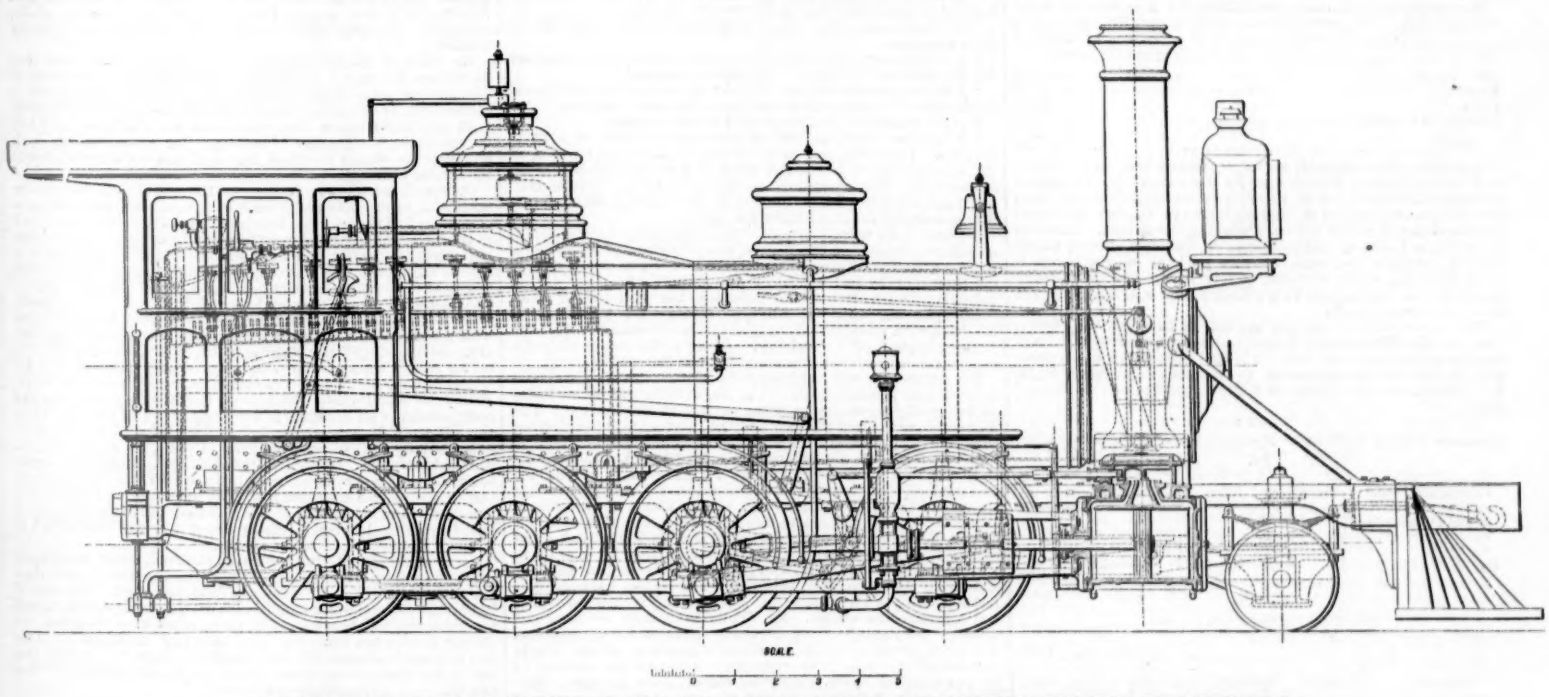
A steel wire netting is placed in front of said deflecting plate to confine the circulating sparks from passing to the open air or coming in contact with the exhaust steam. A straight pipe without any obstruction is used for a smoke stack, the sparks after falling to the bottom of the smoke-box come in contact with an injector operated with a bell-crank and rod, under the control of the engineer. The power used to operate the injector is a small portion of exhaust steam, which cannot be noticed by an expert. From the mouth of the injector a pipe is so arranged as to convey the sparks and steam to the fire-box. The moist steam used, being of a low temperature, readily combines with the smoke and gases, thereby supplying a deficiency needed to ignite them. Instead of admitting cold air into the furnace, warm, moist steam is admitted.

The netting to insure against clogging while on the road is provided with a striker, under control of the fireman, and operated from the cab of the engine, the whole arrangement requiring no attention whatever while running.

Mr. Hill explains to your committee that the company he represents are burning bituminous coal and running fast and heavy passenger trains through a country thickly covered with pine and scrub oak easily fired during the summer months; that previous to the perfection of his device they were constantly firing the woods, causing much damage to property and annoyance to passengers; that the use of his device has secured immunity from setting fires, not only arresting but perfectly consuming the sparks and smoke, and also preventing the falling of fine dust from the train, improving the steaming qualities of the engine and resulting in a saving of fuel; that it is easily applied and at a very moderate cost; has been in service a year, and he has been directed to apply it to all engines upon his road. Mr. Hill cordially invites an examination from all interested. A drawing is submitted.

Engines of Fairlie or Forney Design.—Mr. Wilder, of the Erie Railway, reports having one of the Fairlie engines, designed by William Mason, running short trips on his road between Buffalo and the International Bridge, and that the engine performs a very severe service and does it successfully, though considerable trouble is experienced through leaky steam-pipes, which difficulty, he thinks, is a mechanical one and can be easily overcome in construction. Not having the data for the cost of repairs, for fuel per ton per mile, etc., it is difficult for the committee at present to arrive at any conclusion as to the comparative merits of the engine.

Mr. Wells reports the building of three engines similar to those designed by Forney, for short runs on suburban passenger trains between Louisville and New Albany; they have



"CONSOLIDATION" LOCOMOTIVE, BUILT BY THE BALDWIN LOCOMOTIVE WORKS, PHIADELPHIA.

Exhibited at the United States International Exhibition.

proved successful for that purpose, yet he does not consider them suitable for general traffic. Your committee, in last year's report, referring to locomotives designed for very heavy work, recommended the class of engines known as "Consolidation." Since the report was written the Pennsylvania Railroad has adopted this class as its standard freight engine. This adoption by a leading railroad of a locomotive differing so widely in its dimensions from those generally used in ordinary freight service is undoubtedly a bold step in locomotive engineering, and it will certainly attract much attention. Your committee have therefore collected as much information as possible relative to the comparative cost of running these and ordinary freight engines. With reference to the loads hauled by these heavy engines, it may be well to say that no practical difficulties are experienced, on the Pennsylvania Railroad and the Northern Central Railway level divisions, when hauling trains of from 80 to 90 loaded cars at 15 miles an hour. These cars weigh about 18,000 lbs., when empty, and their maximum lading is 28,000 lbs. These long trains are hauled round sharp curves of which the radii range from 650 feet upwards. In exceptional cases very much sharper curves than this are passed: thus on the Baltimore & Ohio Railroad there is a Y, a tracing of which is attached, with curves of 136 feet radius, and consolidation engines are run round these curves without trouble; in fact, no difficulty has been reported in using them in all cases like ordinary freight engines. The introduction of the consolidation engines for ordinary freight service is too recent for us to know what the effect on the cost of transportation will be. We have, however, collected some information which may help us to form an estimate for any given railroad, of how some portion of this cost will be affected.

Accompanying this paper are statements furnished by the Lehigh Valley Railroad and by the Pennsylvania Railroad, which show how many cars can be handled by consolidation engines over roads with certain controlling grades; what has been the cost for repairs, per engine-mile, of consolidation engines when used on the mountain grades of the Lehigh Valley Railroad for coal trains and as pushers on the heavy grades of the Pennsylvania Railroad; also the amount of stores used by these engines, and the consumption of fuel per car mile. To show some of the results to be expected from the use of consolidation engines, the following estimates have been made and are submitted to the Association, not as established facts, but as suggestions which may possibly interest some of our members, and which will, at any rate, indicate to us the importance of collecting fuller details of the cost of transporta-

tion so far as it is affected by modifications of the motive power. Let us take for example one division of a railroad, say 100 miles long, and which does a freight business during the year represented by 10,000,000 car miles. Let the controlling grades be taken at 70 feet to the mile. An ordinary 10-wheel engine will haul over such a road 15 cars; a consolidation engine will haul 25 cars. With 15 cars in train it would take 6,666 trips to perform the work of the division. Allowing 100 miles as a day's work for train hands, an engineer at $3.50, a fireman at $2.00, a conductor at $2.50 and three brakemen at $2.00 each, make $14 per trip for train hands, or $93,324 for train hands per annum. Taking 25 cars in train gives 4,000 trips, or $56,000 for train hands. The cost of repairs, per mile, of 10-wheel engines, at 6 cents per mile, for 666,600 miles, would be $39,996; of consolidation engine, at 8.5 cents per mile, for 400,000 miles, would be $34,000. Taking the saving of fuel at 0.3 lbs. per car mile for the consolidation, it would give a saving of 1,500 tons on the 10,000,000 car miles, or say at $3 per ton, $4,500.

The interest on cost of power may be estimated thus: Allowing each engine to make 3,000 miles per month, it would take 18 ten-wheel or 11 consolidation engines in working order during the year to give the required service. Allowing two engines, or about 11 per cent. of ten-wheel engines, to be in shop for repairs and three engines, or about 29 per cent. of the consolidations, for same reasons, we get 20 ten-wheeled or 14 consolidations as the required number.

20 ten-wheel engines at $9,000 each		$180,000
Engine house room for 20 engines, say		20,000
		$200,000
Capital invested for motive power in one case and		
14 engines, at $11,000 each	$154 000	
Engine house room, say	14,000	168,000
Showing a difference of		$32,000

These savings in engines by using consolidation engines amount to, for one year:

For train hands	$37,324
For repairs	5,996
For fuel	4,500
For 6 per cent. interest on capital	1,920
Total	$49,740

Now performing the same calculation for a moderately level division with a few grades not over 20 ft. to a mile and with a car mileage of say 20,000,000, we get a difference in favor of consolidation engines of $45,296, the items of saving being

Train hands	$24,584
Repairs	6,672
Fuel	12,000
Interest on engines	2,040
Total	$45,296

In making this estimate, we have allowed one more brakeman for the train of 80 cars than for the train of 45. The above estimates are based not on theoretical considerations of what the comparative duties of engines ought to be, but on actual results obtained under ordinary working conditions. The cost of repairs is based on an experience of six years, during which time the engines have been used as pushers on the Pennsylvania Railroad, where the duty is very severe and the mileage small, and on the Lehigh Valley Railroad as coal train engines over a mountain grade.

The consumption of fuel per car mile is based on the experience of only three months with nine engines, therefore the saving from this source can only be looked upon as an approximation, though the amount saved by the consolidations is much less than the results shown on Table C might lead us to hope for.

TABLE A.

Maximum Train of loaded cars. Average weight of cars with load 41,000 lbs.

Controlling Grade.	Ten Wheeled Engines.	Consolidation.
20 feet to the mile.	45	80
70 " " " "	15	25
96 " " " "		15
116 " " " "		12

TABLE B.

Cost of Repairs and Stores per mile.

Engine.	Road.	Mileage.	Cost per mile. Rep's.	Stor's.	Gen'l. Av'g. Rp's.	Sto's.
J. M. Porter	L. V. R. R.	164,808	7.8	2.6	.....	.....
J. O. Stearns	"	147,432	9.4	2.6	.....	.....
Mogul	"	90,375	4.5	2.1	.....	.....
Tycoon	"	89,773	3.8	2.3	.....	.....
Maryland	"	88,305	4.3	1.8	.....	.....
Virginia	"	81,727	3.9	1.9	6.2	2.3
1,093	P. R. R.	154,980	9.9	1.2	.....	.....
1,111	"	65,066	11.2	1.4	.....	.....
1,114	"	82,913	10.0	1.2	.....	.....
1,115	"	60,844	8.8	1.4	.....	.....
1,130	"	66,180	8.1	1.3	.....	.....
1,131	"	44,737	9.3	1.1	.....	.....
1,146	"	36,961	5.8	0.9	.....	.....
1,147	"	27,790	6.9	1.3	.....	.....
1,148	"	43,120	5.2	0.7	8.9	1.2
1,149	"	66,326	6.6	0.6	.....	.....
1,150	"	61,935	6.2	0.6	6.4	0.6

TABLE C.

Average Train mile Consumption of Fuel per car mile.

Engine.	Road.	February, 1876. Coal.	Cars.	March, 1876. Coal.	Cars.
113	P. R. R.	5.0	25.9	4.7	28.5
72	"	3.9	28.0	4.2	28.0
77	"	4.1	26.5	4.4	28.3
85	"	4.0	29.2	4.4	27.3
134	"	4.5	25.4	4.3	29.5
213	"	3.7	26.3	4.1	29.0
293	"	4.0	26.9	4.3	25.8
1,004	"	3.8	33.2	4.2	33.2
1,011	"	2.7	55.0	2.7	59.0
		October, '75.		November, '75	
1,149	"	2.5	44.0	2.8	42.0
1,150	"	2.9	45.0	2.8	44.0

The general dimensions of the Consolidation class are sufficiently familiar to make a detailed description unnecessary. They are essentially American in all their details, though we believe they have been exported by some of the locomotive builders to foreign countries. Their simplicity of construction forms a marked contrast to the complicated designs of engines for similar service by foreign builders. We believe the first Consolidation engine was designed by a member of our Convention, Mr. Alexander Mitchell, then of the Lehigh & Mahanoy Railroad. The designs were submitted to the Baldwin Locomotive Works and were at that time considered so great a departure from ordinary practice that Mr. Mitchell had to assume the responsibility for the success of the engine.

The officers of the railroad, having the greatest confidence in Mr. Mitchell's judgment, were guided by it, and the engine was built. At the completion of the first one the Lehigh & Mahanoy Railroad happened to be consolidating with the Lehigh Valley, and so the name "Consolidation" was suggested, which has since been adopted all over the country; for the merits of the engine on heavy grades were soon apparent and large numbers of them were constructed by the various builders. They are now a recognized class of American engine. Some alterations have, of course, been made since the first was built, which was in 1866, and we have attached to this report a sketch of the engine, kindly furnished by the Baldwin Locomotive Works, which shows pretty plainly the general plan of construction of the most recently built locomotives.

The report on the "Best and Most Economical Metal for Locomotive and Tender Bearings" was then read, as follows:

THE BEST AND MOST ECONOMICAL METAL FOR LOCOMOTIVE AND TENDER BEARINGS.

To the American Railway Master Mechanics' Association:

GENTLEMEN: Your committee, appointed at the last annual meeting to report on the best and most economical metal for locomotive and tender bearings, issued the following circular to each member of the Association:

"DEAR SIR: The undersigned were appointed at the last Convention of the American Railway Master Mechanics' Association, to report on the 'Best and Most Economical Metal for Locomotive and Tender Bearings.' They, therefore, respectfully request that you will give them the benefit of your experience, and reply to the following questions as early as possible:

"1. What composition of metals do you use on your railroad for engine driving axle-box bearings, what for engine truck bearings, and what for tender bearings?

"2. Please give the length and diameter of journals, thickness of bearings, and the average mileage run per 1-16 of an inch in thickness of metal worn away in each of the above cases, and the amount of 'end play' allowed to each class of bearings on axle journals.

"3. What composition of metals do you use for connecting and coupling rod bearings?

"4. Do you insert Babbitt or white metal in any of your bearings, and do you consider its use as of any advantage in reducing the frictional wear of either the journals or bearings, and what form of recess in the bearings do you cut for receiving this metal?

"5. Have you made any experiments in different alloys for journal or other bearings on locomotive engines?

"6. Please state what these experiments were, and the results attained.

"7. From your experience what metal would you recommend for the different bearings on locomotive engines?

"The Committee will also be glad to receive any additional information or suggestions relating to the above subject."

Fifteen members have responded to the circular.

For axle-box bearings, five members use an alloy of 6 parts copper to 1 part tin, one member uses 5 parts copper to 1 of tin, another uses 6½ to 1, and another 9 to 1 of copper and tin respectively. The remainder merely say they use "gun metal," or "hard brass," or brass lined with white metal, without further specifying the mixture of the alloys.

Several of the members appear to use Babbitt, or anti-friction metal, in a greater or less degree, the prevailing practice being to insert the Babbitt or white metal in recesses or grooves, varying their lengths and widths in proportion to the sizes of the journals. One or two of the members use skeleton or shell brasses; having projecting ribs circled to fit the journals, and fill them with white metal, so that the latter entirely forms the working surface of the bearing. Other of the members prefer solid brass without the use of any Babbitt for axle bearings.

For connecting and coupling-rod bearings, the alloy is mostly made of 6 or 7 parts copper to 1 of tin, with Babbitt strips formed diagonally across the working surface of the bearing. The following particulars will probably be interesting as exhibiting the different practices adopted by some of our members:

Mr. R. Wells, of the Jeffersonville, Madison & Indianapolis Railroad, says he uses "gun metal" for all bearings of engines and tenders. He inserts Babbitt metal in all bearings, except for cross-head ends of main rods. The Babbitt is run into a recess on each side of centre line of bearing, one inch wide, for driving bearings, three-fourths of an inch wide for trucks, and half an inch wide for tender bearings, extending in length to within one inch of each end for driving, and within half an inch for truck and tender bearings. The space between the Babbitt strips is 1¾ inches for driving, 1⅛ inches for truck, and 1¼ inches for tender. Mr. Wells says that he does not consider the Babbitt of any advantage in inducing the frictional wear of journals; he thinks it rather increases it; but it aids in reducing the wear of bearings and prevents the cutting of the journals, for which reasons he recommends its use. Mr. Wells gives the following sizes of journals as the standards on his road: driving, 7⅞×6½ in.; engine truck, 8⅛×4¾ in.; tender trucks, 6×8⅛ in.

The end play allowed is ⅛ in. for engine bearings and 3-16 in. for tender bearings.

Mr. Jacob Johann, of the Western Division of the Toledo, Wabash & Western Railroad, says he uses for axle bearings a brass composed of copper 85 per cent., tin 12.1 per cent., zinc 2.9 per cent. These bearings have a dovetailed groove ⅜×⅜ in. on each end, running from end to end, filled with a white metal composed of tin 89 per cent., antimony 7¼ per cent., copper 3¾ per cent. In the crown of the brass there is a cavity 1⅛ in. wide and ⅝ in. deep, extending in length to within ⅝ in. from each end. The object of this cavity is to equalize the wear on the body of the metal. For engine and tender-truck bearings he uses brass shells lined with white metal to form a complete bearing surface. The composition of this metal is as follows: lead, 67 per cent.; tin, 23; antimony, 10 per cent. Mr. Johann speaks strongly in favor of these bearings. He says they are not original with him, but he has had a long experience with them on other roads, with as much satisfaction then as he is now having. As a proof of the superiority of this lined bearing over the plain, solid brass bearing he writes thus: "Relative to the value of this bearing, I will mention but one case among many. Under one of our 32-ton passenger engines on a regular run of 110 miles and return, there were two solid bearings which continually ran hot, causing much trouble and delay. I had the bearings removed and found the journals quite badly cut. This afforded an excellent opportunity for testing the shell bearings. Without in any way mending the cut journals, I replaced the solid bearings by the shells with white metal linings. During the first trip the boxes ran warm, not hot, for several miles, and then gradually cooled. They gave us no further trouble. Six or seven weeks after they were put in I inspected the journals and found to my surprise that they were comparatively smooth. The bearings were not much worn, and everything was in excellent condition. They have been running now for three months and have never been hot." He further writes:

"When I commenced my present engagement, solid brasses were universally used on this division. During the summer months of 1875, hot boxes were the greatest source of annoyance connected with our passenger trains. It seemed impossible with any kind of lubricant to keep cool boxes. I was obliged to do something. I introduced these white metal bearings, and the result was success. Hot boxes are now rare where before they were general."

Referring to the size of journals, the standards adopted on his road are: For driving, 8×7 in.; engine truck, 9×5 in., and tender truck, 7×8¾ in. He allows for end play ⅛ in. for engine and ¼ in. for tender bearings. With respect to the size for engine truck journals, he remarks that since adopting the 9×5 in., he has had no trouble with hot boxes, the journal and bearings have worn better and needed fewer repairs, while the consumption of oil has been very much less than with smaller journals.

Neither Mr. Wells nor Mr. Johann give any data as to mileage run for any specific thickness of bearing worn away.

Mr. C. Graham, of the Delaware, Lackawanna & Western Railroad (Bloomsburg Division), mentions one case which recently came under his notice where the engine had run 178,000 miles, and the driving bearings (which were plain, solid brass composed of copper and tin in the respective proportions of 6 to 1), had only lost a full eighth of an inch from their original thickness, which gives about 80,000 miles run per one sixteenth of an inch worn away. Mr. Graham says he uses no Babbitt metal except for connecting-rod bearings, as he is doubtful that any advantage is gained from its use.

Mr. Woodcock, of the Central Railroad of New Jersey, says some of his engines have been run 56,000 miles for one-sixteenth wear in thickness of driving bearings and 15,000 miles for engine truck bearings. In the latter he uses Babbitt metal, but it does not appear that he uses it for driving bearings. His journals are 8×6½ in. for driving; 7½×4½ in. for engine trucks; and 6×3¼ in. for tender trucks. The end play of his engine bearings is 1-16 in., and ¼ in. for tenders. He thinks there is an advantage in the use of Babbitt, but can give no data as to economy.

Mr. P. Clark, of the Northern Railway of Canada, prefers using plain brass (6 parts copper to 1 part tin) for all engine axle bearings, although a number of his engines are running with Babbitt bearings. He considers Babbitt metal beneficial for rod bearings when properly applied in strips from end to end, because in that form it maintains the true outline shape of the bearings, which is destroyed generally when the Babbitt is confined at the ends by the brass, as in the case of recesses filled in by Babbitt.

One great reason Mr. Clark has for objecting to the use of Babbitt for axle bearings is because they are not easily got at to examine from time to time. He adopts the plan of recessing a cavity in the crown of his driving bearings as a means of preventing undue wear on the sides, and the consequent "knocking" experienced as the bearings become worn. The average mileage his engines run per one-sixteenth wear of bearings is: for driving, 30,000; for engine trucks, 9,100; and for tender trucks, 6,600 miles. The sizes of journals are: Driving, 8×7 in.; engine truck, 6¾×4½ in.; tender trucks, 6×3¾ in. End play given is 1-32 in. for engines, and ⅛ in. for tenders.

Mr. Ellis, of the Philadelphia & Reading Railroad, says that he prefers the use of Babbitt for axle bearings on the score of economy, as some of his ten-wheel freight engines have run a distance of 14,000 miles with Babbitted bearings, as compared with only 10,000 miles when they were not Babbitted, per 1-16 in. reduction in thickness of bearing. He allows half an inch end play for tender bearings, but does not say what is allowed for engine bearings.

On the Great Western Railway of Canada the practice in operation is to use only plain brass bearings, composed of 5 parts copper to 1 of tin for axle bearings, and 5½ parts copper to 1 of tin for connecting and coupling-rod bearings. These bearings work admirably, and a hot box or journal on any engine is almost unknown. The average mileage (taken from several engines) per 1-16 in. wear of bearing is 33,000 miles for driving and 24,000 for engine and tender-truck bearings. Occasionally some of the truck and rod bearings have been Babbitted, but with no advantageous results. The standard sizes of journals are: driving, 7½×7 in.; engine truck, 8×4½ in., and 5½×3⅝ in. for tender trucks. The end play usually allowed is 1-16, ⅛ and 3-16 in. for each of these journals respectively. Mr. F. M. Wilder, of the Buffalo Division of the Erie Railway, says the composition of all bearings is 6 of copper to 1 of tin. He gives the following dimensions as the standard for their axle journals: driving, 8×7 in.; engine truck, 10×4½ in., and 7×3½ in. for tender trucks. He writes: "Babbitt or anti-friction metals are used on all rod connections, also in the driving-box bearings. Our driving boxes are lined with gibs of brass or hard metal, one on top and one on each side, fitted perfectly into dovetailed grooves, leaving a space about 1⅛ in. wide which is filled by Babbitt metal being cast in."

As a summary of the evidences received, your committee think the majority favors hard brass, composed of 6 parts copper to 1 part tin, for all axle and rod bearings. The use of Babbitt is not generally adopted for driving axle bearings, but for truck and rod bearings it is more often used than not, although it does not appear to give universal satisfaction. The fact generally admitted is that Babbitt tends to *lengthen* the life of the bearing, but it also tends to *shorten* the life of the journal.

Respectfully submitted,

JOHN ORTTON, Great Western Railway.
F. M. WILDER, Erie Railway.
P. CLARK, Northern Railway of Canada.

This report was discussed as follows:

Mr. Woodcock, of the Central Railroad of New Jersey, stated that he found that with steel pins Babbitt metal was necessary. On some new engines which were built by the Baldwin Works they had trouble from the solid brass bearings and steel crank-pins and were obliged to substitute Babbitt instead. On his road they have adopted Babbitt metal bearings for crank-pins.

Mr. Frink thought that Babbitt metal was not necessary and cost about twice as much as brass.

Mr. Clarke said if Babbitt was made of the proper alloy there was no trouble.

Mr. Wilder, of the Erie road, said that his experience was that with steel pins Babbitt was necessary.

Mr. Hill, of the Camden & Atlantic, could not use solid brass, but was obliged to resort to Babbitt. He had tried various kinds of bearings.

Mr. Robinson, of the Great Western of Canada, considered that a soft metal like Babbitt was needed to compensate for the mechanical inaccuracies. In some machine shops, where cheap machinery was manufactured, he found they used melted metal, which was poured or cast around the journal in order to make fits. A thin sheet of lead was used in car journals, so that on a new journal the soft metal would, by the compression to which it was subjected, fit the journal accurately. He thought that Babbitt ought to run all the way across the journal.

Mr. Kinsey, on the Hannibal & St. Joseph, was using what is called the Towne truck, with long bearings. He had run them 93,000 miles with one set of white metal bearings.

Mr. Hudson, of the Rogers Locomotive Works, thought that the difference in the expense between brass and Babbitt was due to the difference in its composition. The best Babbitt was composed of one part copper and nine of tin. If not made of the proper composition, it would not wear well. On crank-pins and all journals it was a question of surface and pressure. If the pressure per square inch of surface was too great, there would be a liability to heat, and if one kind of metal will not stand the wear, another must be used. Soft metal collects dirt and grit and thus cuts away the journals, and the loss from this cause more than compensates for the saving in the wear of the bearing.

The following report on injectors and pumps was then read:

REPORT ON INJECTORS.

To the American Railway Master Mechanics' Association:

GENTLEMEN: Your committee appointed to report on the following subject: "Is it economical to use injectors upon locomotives, and if so, to what extent?" beg leave to submit the following:

Circulars of inquiry were issued in the usual manner, and elicited fifteen replies from master mechanics in charge of 909 locomotives, of which 378 engines have pumps and injectors, 494 have pumps and no injectors, and 5 engines have injectors and no pumps.

The prevailing opinions expressed in the replies to our circular are:

1st. Injectors are valuable auxiliaries to pumps, on locomotive engines.

2d. Injectors are not so reliable as pumps for feeding locomotive boilers.

3d. There is no economy in fuel from the use of the injector.

4th. The cost of construction and maintenance of pumps and injectors is about the same.

Your committee could not learn of any careful experiments having been made for the purpose of determining the comparative reliability of pumps and injectors for engines in passenger and freight service, or which method of injecting the feed water involves the greater consumption of fuel.

Recognizing that reliability and economy in fuel are the main things to be considered, the Chairman of your committee, Mr. E. T. Jeffery, conducted a series of experiments with a freight engine on the Illinois Central Railroad, with the results given in the tables which form a part of this report.

EXPERIMENTS WITH THE PUMP, ILLINOIS CENTRAL RAILROAD. Pounds of coal per mile, 74.44.

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RAILROAD GAZETTE

Published Every Saturday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

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Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ON CONDUCTING BUSINESS.

Railroad managers and executive officers, in the transaction of their complicated and perplexing duties, doubtless very often have occasion to wish that some general rules were formulated for their guidance, or that some "scientific method" for conducting their affairs were possible. That a science of the transaction of business is impossible is not at all certain. If political economy is reduced to fixed laws—which is denied by some—or if there may be a science of government, why not a similar evolution of the principles which apply to the transactions of daily life, or to the relations of those who are interested in various ways in the traffic, the operation or the construction of a great work like a railroad. The frequent disagreements and, it may safely be said, the blunders of railroad managers afford a basis for computing the value of such a science, if by clearly formulating its laws it could prevent wars and rumors of wars, and lessen the number of disputes and diminish the amount of litigation, all of which are such serious obstacles in the way of the success of railroads.

We have before us a little book by Sir Arthur Helps*—an author from whom we have often quoted in these pages—which gives some hints of what such a science of business might be. The book is not new (1871) and makes no pretensions to being in any sense a scientific treatise, but consists only of a few short essays on such subjects as the "Transaction of Business," "Choice and Management of Agents," "Interviews," and "Counsels and Commissions." They are very pleasant reading, and have scattered through them maxims and suggestions which are often so wise as to be worthy of being embodied in some more formal code.

Thus of "dealing with the business itself" the writer says, what many a railroad manager will recognize as being as true as though it had been taken from his own experience, "Begin with the earliest history of the matter under consideration. Be careful not to give way to any particular theory, while you are merely collecting materials, lest it should influence you in the choice of them." The warning in the last sentence seems like a familiar friend or a well known enemy. Who that has ever had much dealing with railroad men cannot recall in his own experience having seen persons undertaking investigations in which all the material which they collected was only that which supported their own theories, and all else was thrown aside? Doubtless if we could "see ourselves as others see us" we would find that we too have often done the same thing.

About deciding on information which has been collected, the author advises "not to lose attention in reveries about the subject, but to bring yourself to the point by such questions as these: What has been done? What is the state of the case at present? What can be done next? What ought to be done? Express in writing the answers to your questions." The latter, we fear, will be little heeded by very busy railroad men, although it is doubtless true that the use of the pen "prevents the mind from staggering about, and forces a person to methodize his thoughts."

Most persons have found it very difficult to announce their decision on a subject, especially when it is likely to be unwelcome or give pain to those to whom it is to be conveyed, and who are probably the most concerned or affected by it. The following advice will often be of service in doing this: "Very rarely, if ever, say anything which is not immediately relevant to the subject. Beware of indulging in maxims, in abstract propositions, or in anything of that kind. . . . Human affairs are so wide, subtle and complicated, that the most sagacious man had better content himself with pronouncing upon those points alone upon which his decision is called for."

Many men who have been schooled in practical experience have learned the danger of stating the reasons for their decision on any given question. The general principle which is laid down by our writer is that "when you can give *all* your motives, it will in most cases be just to others, and eventually good for yourself, to do so," but—and here we must try and condense into our own language what he has said more at length and much better than we can hope to—if you cannot give all your reasons it may be, and probably will be, that the chief and most irrefutable one is that which is is not best to disclose. The others may be easily answered, so that a person may be placed in the position of having all the apparent ground for his decision taken from under him, and yet be obliged to maintain what is apparently an untenable position, and find himself ultimately "precluded from using an argument which turns out to be a very sound one and which had great weight with him."

Perhaps no more difficult and perplexing duty falls to the lot of a railroad manager than "the choice and management of agents." The word agents is of course used in a very general sense, and not in the restricted one in which it is ordinarily employed to designate a special class of persons on railroads in this country. Generally the importance of bestowing much labor in making such choice does not appear until it assumes a sort of penitential character of regret for the shortcomings of those for whom the appointer is responsible; or, in the language which is ready-made before us, "you have to choose persons for whose faults you are to be punished." In doing this, the writer calls attention to a principle which he has insisted upon in other places before—that is, that what a man knows is no certain criterion of the manner in which he will perform a particular service. Hence the value of any opportunity, however slight, of observing his conduct in matters similar to those for which you want him. This principle, we are inclined to believe, has been carried too far in this country; or, rather, "what a person knows" has been regarded too little rather than too much, and in very many cases we feel certain that the fact that a person knows a great deal that is worth knowing, or, in other words, is liberally educated, is regarded as sufficient reason for *not* selecting or employing him in railroad service. These college-bred fellows, with glib tongues and ready pens, are too apt to be regarded as dangerous subordinates on railroads, although they may be efficient in every other way in the performance of their duties. It is surprising to see how quickly ignorance takes alarm and bands together in self-defence, and how suspicious it is of knowledge. Now, what our writer says is quite true, that what a man knows is not a certain criterion of what he will perform; but it is also true that knowledge is an important element in a person's capacity for doing, and that to be without it implies inability to do what is much worth doing.

"The best agents are, in general, to be found among those persons who have a strong sense of responsibility. Under this feeling a man will be likely to grudge no pains; he will pay attention to minute things; and, what is of much importance, *he will prefer being considered ever so stupid, rather than pretend to understand his orders before he does so.*"

It may appear that this is elevating stupidity to the rank of a virtue, but it must be observed that being stupid and being *willing to appear* stupid rather than to be ignorant of duty are two very different things; the latter being in reality a virtue. It is very common for a subordinate to pretend that he understands, rather than to "*appear stupid*," often with very disastrous results. The common practice of obliging train-men to answer back how they understand directions given them for running trains is intended to guard against such misapprehension. A willingness to appear stupid is therefore only another name for a regard for duty higher than the value which is placed on the good opinions of others. This virtuous willingness to appear stupid implies, however, a corresponding duty on the part of the superior, which is thus stated: "You should behave to your subordinate agents in such a manner that they should not be afraid to be frank with you." Nearly every railroad employe knows the irascible sort of superior, who flies into a passion on the slightest pretext, and whose delight it seems to be to inspire abject fear in all who are unfortunate enough to be placed in his power, and who appears to aim at making his subordinates *unwilling* to appear stupid.

There is, however, another and perhaps stronger reason for dealing with subordinate agents so that they may not be afraid to be frank with their superior. It is that "they should be able to comment freely upon your directions, and may thus become your best counsellors. For those who are intrusted with the execution of any work are likely to see things which have been overlooked by the person who designed it, however sagacious he may be." How many persons who have designed machinery or buildings have had cause to regret bitterly that they did not take the advice or have the comments and criticism of their subordinates before they became hopelessly involved in difficulties which "those intrusted with the execution of work" would have perceived at once? Few new time-tables which are made up would not be improved if freely discussed by the conductors and locomotive runners who must be governed by them.

The following choice bits of wisdom may be laid to heart by many who have the charge of agents with much advantage to both:

"You must not interfere *unnecessarily* with your agents, as it gives them the habit of leaning too much on you."

"It should be your aim to create a standard as to the way in which things ought to be done, not to do them all yourself."

"The limits which you lay down for the guidance of agents should be *precise*. Within those limits you should allow them a large discretionary power."

"If you are in haste to blame your representative, your captiousness may throw a great burden upon him unnecessarily. It is not the success of the undertaking only that he will thenceforward be intent upon; he will be anxious that each step should be done exactly after your fancy. And this may embarass him, render him indecisive, and lead to his failing altogether."

"The surest way to make agents do their work is to show them that their efforts are appreciated with nicety."

It sometimes seems extraordinary that the latter motive has not been employed to a larger extent in the management of great enterprises such as railroads have grown to be. Generally we have found that there prevails among railroad employes a craving for the approbation of their superior officers. In the insatiable thirst for money, and the inordinate over-valuation of it, which our nineteenth century civilization has developed, we have forgotten how much honors are prized even in this mercenary age. Honors conferred in recognition of courageous deeds, faithful service, or incorruptible integrity, might, it is believed, be made one of the most powerful means of securing the very best service, and that feeling of allegiance or fealty which every superior, whether the mistress of a household, a superintendent of a railroad or a general of an army should aim to cultivate.

"Councils and commissions" seem likely hereafter to play a very important part in the management of railroads. The "railroad wars" which occur so frequently must either give way to wiser and more civilized methods, controlled either by voluntary co-operation or by the authority of government, or else they will simply result in ruin to the railroads which engage in them. There seems no inclination at present, nor does it seem possible with our system of government, to resort to government control, so that immediate relief from such hostile relations must be looked for only from some sort of voluntary co-operation. The following quotation from Bacon's Essay on "Dispatch" is all that we have room to copy from what our author says on "Councils and Commissions:" "There be three parts of business: the preparation; the debate, or examination; and the perfection; whereof, if you look for dispatch, let the middle only be the work of many, and the first and last the work of few." Or, to state this in the language of Sir Arthur Helps, "It should be the business of some one, either in the council or subordinate to it, to bring the matter forward in a distinct and definite shape. Otherwise there will be a wilderness of things said before you arrive at any legitimate point of discussion."

Perhaps at the present time no service of more immediate value to railroad companies could be done than to devise some wise and efficient system for conducting commissions and conferences which are held to arrange disputed points amicably. At any rate the study of what might be called railroad jurisprudence seems likely to attract, and certainly deserves, more attention than it has thus far received.

* Organization in Daily Life.

Traffic for April and for Four Months.

After so severe a shock to the national industries as that which they suffered in 1873, and from which they still suffer seriously, every movement which gives any clue to the course of business should be watched carefully. The resumption of many manufacturing and some other industries depends upon the probability of an increased demand for their productions, and this demand itself can be foreseen (if at all) only through a study of the course of the other leading industries which are still active, chiefly those which afford a surplus of products for export, which in this country are agricultural products and petroleum.

To make anything like an effective exhibit of the effect of the movement of these products on general business, we need to know their prices as well as the quantities marketed. The latter, however, by themselves afford an index to many of the most important branches of railroad traffic.

The staples whose movement is reported below form but a fraction of the entire traffic, and an insignificant one on not a few railroads. They are, however, all important, they include the chief exports of the country, and at all events they are the only ones important to the whole country for which statistics are obtainable promptly and regularly.

The following table shows the movement of the staples named during the month of April, for two years :

	1876.	1875.	Inc. or Dec.	P. c.
Northwestern grain receipts, bush.	9,027,207	8,719,994	Inc.. 307,213	3.5
Northwestern grain shipments, bush.	10,140,859	5,069,896	Inc..5,070,963	100.0
Atlantic grain receipts, bush.	8,510,394	6,822,975	Inc..1,687,419	24.7
Anthracite coal movement, tons.	1,745,156	988,674	Inc.. 756,482	76.4
Petroleum export, galls.	14,334,701	16,130,939	Dec..1,796,238	11.1
Cotton receipts, bales.	157,678	124,175	Inc.. 33,503	27.0
Cotton exports, bales.	222,904	173,313	Inc.. 49,591	28.6

Here, with the exception of petroleum, we have an increase in every staple, and a very large increase in most. Northwestern grain shipments have doubled; grain receipts at Atlantic ports have increased by a quarter; cotton receipts and exports are both more than a quarter greater than last year. Anthracite coal, in which there appears an increase of three-fourths in the movement, has been, notwithstanding, in a most unsatisfactory condition, the comparison being with a season when work was almost wholly suspended in the most important mining districts. The petroleum exports, though smaller, were yet large. Generally these figures would indicate a heavy traffic. We know that the grain movement was stimulated by the unprofitably low rates at which grain was carried ; but, however caused, the fact remains that the business was large.

This is the traffic of a single month—the month next preceding the opening of lake and canal navigation. If we begin with the year we will get a view of a period less disturbed by temporary fluctuations.

For the four months ending with April the traffic in these staple for the two years is represented as follows :

	1876.	1875.	Increase.	P. c.
Northwestern grain receipts, bush.	38,305,049	34,252,426	4,052,643	11.8
Northwestern grain shipments, bush.	27,461,337	16,613,822	10,847,515	65.3
Atlantic grain receipts, bush.	36,128,277	29,680,252	6,448,025	21.7
Anthracite coal movement, tons.	3,965,555	3,273,300	692,255	21.1
Petroleum exports, gallons.	65,008,946	54,291,540	10,717,406	19.7
Cotton receipts, bales.	1,574,668	1,209,970	364,698	30.1
Cotton exports, bales.	1,552,946	1,221,385	331,561	27.1

Here we have increases everywhere, and all of them large. The petroleum exports, which, for the month, show a decrease, for the four months show an increase of nearly 20 per cent. Compared with 1875, there certainly has been a great increase in the transportation of these great staples.

But 1875 was a very bad year. Not only was business dull, but for three months the railroads found a special obstruction to their business in the severe weather. That a road did much better in the Winter months of 1876 than in the corresponding period of 1875 is no indication that it was doing well. It is therefore especially encouraging to see that the comparison which was so favorable for the Winter months continues to be so for April.

The percentages of the whole four months' traffic in each staple carried in April for the two years were :

	1876.	1875.
Northwestern grain receipts	23¼	25
" " shipments	37	30½
Atlantic grain receipts	23½	27
Anthracite coal	44	30
Petroleum exports	22	30
Cotton receipts	10	10¼
Cotton exports	14½	14¾

Thus, except in grain receipts and petroleum, the *proportion* of business done in April is maintained or increased, as well as the absolute amount.

As the comparison is with a year of depression, one will do well to look back a little further. In grain we find that the receipts at Northwestern markets were less than in 1874 (when they were the largest ever known) by about one-sixth, but greater than in 1873 by nearly 12 per cent.; the shipments from these markets were greater than in 1874 even by nearly 10 per cent., and 66 per cent. more than in 1873; the Atlantic receipts were nearly one-eighth greater than in 1874, and 90 per cent. greater than in 1873. The anthracite movement is lighter. The petroleum movement is 10 per cent. greater than in 1874, 18 per cent. greater than in 1873, and nearly twice as great as in 1872. The cotton movement is the largest ever known.

Thus, anthracite coal alone, of all these staples, shows a decrease in the quantities marketed. In the others, there is not only an increase in comparison with other years since the panic, but an increase over the best results of previous years—a business absolutely large, indicating progress in production and in consumption.

Some comparisons of prices presented below will give some idea of the income received from the production, on the whole large, discussed above.

New York Prices of Traffic Staples.

	May 12, 1876.	May 14, 1875.
Wheat, No. 2 Chicago spring, per bush.	$1.18	$1.19
Corn, Western mixed.	$0.56 to 0.62	$0.87 to 0.88
Anthracite coal	5.00 " 6.00	5.00 " 6.50
Petroleum, crude, per gallon	.08⅝ to .08¾	0.06½
" refined, standard white	.14	.012½
Cotton, low middling, per lb.	.11 5-16 to 11 9-16	15¾ " .16⅛

Wheat remains almost unchanged; corn is nearly 30 per cent. lower; coal is, on the average of qualities, a little lower; crude petroleum is 40 per cent. and refined 12 per cent. higher; cotton is 28 per cent. cheaper. At the current price, the cotton marketed this year has brought in about the same as the much smaller quantity marketed last year; the petroleum exports, counting them all refined, 34 per cent. more; the coal produced so far, about 20 per cent. more; the wheat, considerably less (the average rate has been lower and the exports smaller); the corn marketed probably a little more (larger shipments and lower prices). The increases and decreases may not balance each other, but there cannot have been any very great difference in the income from these staples in the two years, the first of which was certainly dull throughout. However, there has been a general reduction in the prices of manufactured articles, imported and other, so that the same income as last year is equivalent to greater wealth, as the receipts have greater purchasing power.

The Low East-Bound Rates.

We trace further the results of the reduced rates on east-bound freight by a comparison of the movement by lake and rail from the Northwestern lake ports for the last week of April and the first week of May. The number of bushels shipped from these ports was:

		By rail.	By lake.	Total
Last week of April....	1876	2,072,946	1,634,541	3,707,487
	1875	1,463,849	213,267	1,677,116
First week of May....	1876	2,292,633	2,445,191	4,737,824
	1875	1,075,243	1,465,019	2,540,262

The Straits of Mackinaw were not open until near the close of the last week of April both years, but the Chicago grain fleets usually sail a few days before the opening. Moreover, navigation was clear for some time previously between Detroit, Toledo and Cleveland and Erie, where considerable grain was carried before the Straits were open. We see that in the earlier week 56 per cent. and in the later one 48 per cent. of the grain shipments were by rail this year, against 87 per cent. and 42 per cent. last year. It is noticable that the increase in shipments as compared with last year is very large by lake as well as by rail. The total movement is enormous, as is apt to be the case when navigation opens, rates are low, holders want money, and the demand is fair. The stocks in the Northwest are said to be becoming much reduced, however, and there is no expectation that this extraordinary activity in shipments will continue, though there is yet a great deal of grain to come forward. Rates by rail seem to have continued as they were the previous week, at 20 cents per hundred for grain from Chicago to New York, though there is talk of contracts at 15 cents. To Boston for 25 cents is quoted as the rate, and 18 cents to Philadelphia, and 17½ to Baltimore. The New York rate is so low that it is very difficult to make a difference which will divert grain to Baltimore and Philadelphia.

The effect on the rates by the water route has been serious. By lake from Chicago to Buffalo 3¾ cents for corn and 3½ for corn were the common figures until this week, the opening rate having been about 4½; but Tuesday the rate on wheat to Buffalo was reported at 2½ cents, which is, we think, the lowest figure reached in midsummer last year. On the Erie Canal the rate fell quickly from the opening figure of 8 cents to 7 cents, and Tuesday was reported as 6¼ cents for wheat, 5⅞ to 6 cents for corn, and 4 cents for oats. Last year it was claimed that the boatmen did not make wages, and with the present lower rates they must be doing very badly indeed.

These reductions in the water rates show that, however unprofitable the trade may be, the vessels are not going to tie up yet on account of any rail competition. Aside from transfer expenses, the water carriage from Chicago to New York costs but 9 cents a bushel for wheat, or at the rate of 15 cents per hundred. The common 20 cent rail rate is but 0.44 cent per ton per mile. At this rate, even allowing a quarter of a load back at a rate 50 per cent. higher (and the load cannot be got in these days), a train of 25 cars fully loaded going east would earn in the round trip from Chicago to New York and return only 75¼ cents per mile. But as the additional trains demanded for the east-bound freight attracted by the low rates do not add a ton to the west-bound traffic, which there would be a surplus of car room for without these trains, they should not be credited with *any* of the west-bound receipts. Excluding these, we have a receipt of 55 cents per train mile by the shortest route, and of less than 52 cents by the longest. The average expense per train mile on the New York Central for the last year reported was $1.33; on the Erie, $1.40; on the Lake Shore, $1.21⅕.

Probably one result of the low rates is that the railroads have carried a great quantity of grain which under any other circumstances they would not have carried at all, as the lake vessels would have got it. As there was a great stock of cars with nothing to do, the companies were not so loath to set them moving, even at inadequate rates.

One obvious effect of these rates is that the difference between New York and Chicago prices is probably less than ever before. The quotations for No. 2 Chicago spring wheat reported last Tuesday were $1.06¼ cents in Chicago and $1.21⅕ to $1.22 in New York.

It has been suggested that the great activity in grain movement would soon come to an end for want of grain to carry. Reports from Chicago for last week show that the shipments from that port were greater (by about 5 per cent.) than during the previous week. Receipts, however, were less by a third and were not half as great as the shipments. Of course, at this rate, stocks at the lake ports will soon be exhausted; but as the very nature of the through rail shipments tends to divert grain from lake ports to lines which pass below them, this fact does not settle the question.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Cincinnati, Wabash & Western.—Extended from Alexandria, Ind., south to Anderson, 11 miles.

Anderson, Lebanon & St. Louis.—Extended west 8 miles to Noblesville, Ind.

Wyandotte, Kansas City & Northwestern.—Extended from Buckner Hill, Mo., east to Wellington, 11 miles. It is of 3-feet gauge.

This is a total of 30 miles of new railroad, making 485 miles completed in the United States in 1876, against 229 miles reported for the same period in 1875, 123 in 1874, and 738 in 1873.

Technical Conventions.

The Master Car-Builders' Association will hold its annual meeting in New York, Wednesday, June 14.

The annual convention of the American Society of Civil Engineers will be held in Philadelphia, June 13.

Erratum.

In the letter of Mr. Charles Bender, published in our last number (page 203), a misprint occurs in the last sentence of the third paragraph. It should read: "Whole girders of execution like that relied on in practice have never been tested." In the letter as printed "made" is given instead of "tested."

NEW PUBLICATIONS.

We make the following brief notes of recent publications of interest to railroad men, some of which may be reviewed at greater length hereafter:

Longmans, of London, and D. Appleton & Co., of New York, have published in the series of "Text Books of Science" issued by the former firm a volume of 300 16mo pages, by John Wolfe Barry, a well known English engineer, entitled "Railway Appliances: a description of details of railway construction subsequent to the completion of the earthworks and structures, including a short notice of railway rolling stock." The chapters are: "Acts of Parliament and Other Regulations Affecting Railways;" "Permanent Way;" "Points and Crossings;" "Signals;" "the Block System;" "Stations;" and "Rolling Stock." The series is described as "adapted for the use of artisans and students in public and science schools." The work in question is simple, of course elementary, and doubtless more satisfactory to an American than to an English railroad man; as it tells the latter little that is not familiar to him; while the former may get from it with little trouble an idea of many of the features that distinguish English from American railroad practice. The book costs $1.50. ——Gen. Q. A. Gilmore, perhaps the best known American authority on cements, stones, etc., has written and Van Nostrand has published a 12mo volume of 258 pages on "Roads, Streets and Pavements," on which subject a good book (and good practice) has been very much needed in this country.——Months ago we should have noted the publication, by Van Nostrand, of a work on "European Light-House Systems," a report of a tour of inspection made in 1873, by Maj. George H. Elliott, of the Corps of Engineers, who is Engineer-Secretary of the Light-House Board. It is an octavo of 284 pages, with 51 full-page lithographic plates and 31 wood cuts in the text. The price is $5.——No. 22 of the "Science Series" of the same publisher is Mr. John B. McMaster's paper on "High Masonry Dams."—Those curious to learn some of the details of railroad transportation in Belgium may be glad to hear of a book on the subject (Traite des Transports par Chemins de Fer en Belgique), recently published in Brussels. The book is largely devoted to the legal obligations of carriers, tariffs, etc., and has hardly anything on the technical side of railroads—engineering, operation, etc.——Baron von Weber has issued another of his popular pamphlets on railroad questions, entitled, "Obtaining Safety in the Working of Railroads" (Die Praxis der Sicherung des Eisenbahnbetriebs), a glance at which shows it to be an extremely suggestive work. It is to be followed by a thorough treatise on the same subject, for which some material was collected in this country last summer.——Mr. Edward Vernon, now the Superintendent of the Bureau of Transportation of the St. Louis Merchants' Exchange, has made a report, which the Exchange has published in a pamphlet of 95 pages, containing much valuable material, which we hope to consider hereafter.——Mr. Howard Fleming has published a second edition of his little book, "Narrow-Gauge Railways in America," enlarged from seventy-nine to one hundred and one pages, forty-four of which are covered by a sort of directory of narrow-gauge railroad companies. Unfortunately, the company reports give no information as to to the cost of doing a given amount of work. The price, bound, is $1.50.

A great contrast to the last-named book in the completeness of the facts collected and the thoroughness of the discussion is Baron von Weber's "The Practice of the Construction and Working of Secondary Railroads, Carrying both Freight and Passengers, with Standard and Narrow Gauge," and his little popular pamphlets, "Standard Gauge and Narrow Gauge," and "New Paths of Industry" (all in German); but it is true that Mr. Fleming could not have obtained so complete an array of facts concerning American light railroads as Weber gathered from the experience of the European roads.——A paper—apparently an address or lecture—by Prof. Gustave

Cohn, of Zurich, on an "Academical Education for the Higher Branches of Railroad Management," published in the Swiss railroad journal *Die Eisenbahn*, is a most suggestive utterance on a subject which scarcely any one seems to think about in this country. It is the commercial and administrative side of railroad management with which Professor Cohn deals especially: the technical side he thinks tolerably provided for in some existing courses of study, but not united with that culture which is needed to strengthen a man to treat most successfully the great economical, commercial and administrative problems with which railroad managers have to deal.——*Die Eisenbahn* (*The Railroad*), by the way, is an extremely neat, bright and interesting journal. It is printed partly in French and partly in German, but mostly in German.——As indicative of the extent of German railroad literature, it may be noted that a catalogue recently published, intended to form a complete list of German technical publications that appeared during the five years ending with 1874, has the titles of *one hundred and sixty* different railroad books, besides seven railroad journals. ——As we write we receive the fourth of Baron von Weber's popular railroad pamphlets: "Private, State and Imperial Railroads" (Privat-, Staats- und Reichs-Bahnen), which of course discusses the great question now pending in Germany, and which Weber, as the former manager of the Saxon State railroads, and with his thirty years' active experience in leading positions on railroads of different classes, and more than all by his clear-headedness and broad views, is well qualified to discuss.

MASTER MECHANICS' ASSOCIATION.

Report of the Ninth Annual Convention.

[*Continued from Page* 217.]

the boiler by returning the surplus water to the tank from the injector through an independent pipe having a cock which can be opened wholly or partially, at pleasure. It is evident that the effect of returning the heated feed-water to the tank must be to heat the water in the tank, and perhaps interfere with the working of the injector, and also blister the paint on the tank. To determine these questions, the following experiments were made:

With a steam pressure of 120 lbs. in the boiler, the injector was started and the regulator attachment was opened so as to return nearly all the feed-water to the tank instead of forcing it into the boiler. The injector continued working for 2 hours and 35 minutes, during which time only 257.75 gallons were injected into the boiler, being an average of 1.66 gallons per minute. The injector was worked the whole time to its full capacity. At the expiration of the 2 hours and 35 minutes the injector stopped working, and the water in the tank was heated to the following temperatures:

Water drawn from front end of tank on left side (the injector being on opposite side), 124 degrees; water at man-hole for filling tank, 130 degrees; water drawn from the hose through which injector was supplied, 120 degrees. The steam pressure was maintained at 120 lbs. during the 2 hours and 35 minutes. After testing the temperature of the water in the tank, as described, the injector was started again and the temperature of the feed-water after passing through the injector was measured and found to be 180 degrees. The boiler pressure had in the meantime decreased to 105 lbs. per square inch, and the temperature of the water in the tank was from 120 to 130 degrees, as previously stated. The injector was allowed to work until the water in the tank was heated to 140 degrees at the man-hole, when it was shut off, as the varnish began to soften a little. Efforts were then made to start the injector again but proved unsuccessful for 20 minutes. At the end of that time it started and worked, although the temperature of the water in the tank was found to be as follows: Water drawn from front end of tank, left side, 132 degrees; water at manhole of tank, 138 degrees; water drawn from the hose through which the injector was supplied, 130 degrees. The injector was shut off while these temperatures were obtained, after which it was again started, but the stream broke in three or four minutes, no doubt because the water in the tank was too hot. The pressure in the boiler was 110 lbs. per square inch. The temperature of the air in the building where the experiments were made, ranged from 55 to 60 degrees. This ended the experiments with the injector.

Your committee do not understand that it is within their province to offer any opinions as to the relative values of different kinds of injectors. They desire, however, to call your attention to a few conclusions based on these experiments:

1. A good injector properly attached is as reliable as a pump for feeding a locomotive boiler, provided the water in the tank is not heated to more than 110 degrees Fahrenheit.

2. A small saving in fuel is effected by using an injector, the boiler pressure is steadier, and the boiler is subjected to fewer changes in temperature.

3. A pump will feed only when the engine is moving, but an injector will feed the boiler when the engine is in motion, or at rest.

Your committee also desire to state that, in their opinion, efforts should be made to construct an injector which can be regulated from full feed to one-tenth full feed without the regulator attachment herein described; it should also work well at an elevation of not less than four feet above the level of the water in the tank, and should be placed in a convenient position on the engine. It is possible that in a warm climate or under a hot sun the return of the surplus feed-water to the tank may heat the water in the tank to 120 or 130 degrees in much less time than 2 hours and 35 minutes, which was the time required when the atmosphere was from 55 to 60 degrees. On this point your committee cannot give any information founded on fact.

This is the only objection your committee can see to the plan of reducing the amount of water injected into the boiler by returning the surplus feed-water to the tank.

Your committee desire to return their thanks to Mr. S. J. Hayes, Superintendent of Machinery of the Illinois Central Railroad Company, for his kindness in affording the Chairman of your committee every possible facility for conducting these experiments.

As one of the members of this committee has not been heard from, although the Chairman has written to him three times, his name is not appended to this report.

Respectfully,

E. T. Jeffery, Illinois Central Railroad,
G. W. Cushing, Missouri, Kansas & Texas Railway,
Committee.

In the discussion which followed:

Mr. Robinson inquired at what point in the boiler the water was admitted.

Mr. Hayes replied that it was in the usual locality, that is, at the front end of the boiler.

Mr. Robinson asked whether the pipe was not more exposed if attached in front.

Mr. Hayes said there would be less liability to freeze up if the check valve was attached behind.

Mr. Fry said that on several roads in this country the checks are attached at the fire-box end. This is the case in some engines on the Erie and the Northern Central roads. No injurious effect was there experienced from the admission of feed-water at that point.

Mr. Wells said the check was attached at the back end merely for convenience.

Mr. Wells, of the Jeffersonville, Madison & Indianapolis, said that many years ago builders attached the check valves at the side of the fire-box, but it was found that a heavy scale soon formed on the plate opposite the check. He thought that effect would always take place, and that the time would be precipitated when the feed-water first became heated. He found a good deal of trouble when injectors were first introduced, from the accumulation of lime on the injector nozzles; was obliged to take them out frequently and clean them, and the use of injectors was abandoned for that reason.

Mr. Woodcock said that some years ago their road received four engines from Baldwin, and it was found best to change the injector checks from the furnace to the front end of the boiler. He thought it was best to deliver it in front.

Mr. Lewis considered that it would be desirable to place the check in a position in which the scale could be removed through a hand-hole plate.

Mr. Hudson said there were other objections to introducing water at the fire-box than the formation of scale. The temperature at the fire-box is high, whereas at the front end of tubes it is much lower. It is said that nearly all the water evaporation by the tubes occurs in the first few inches of the first foot of their length. The front ends of the tubes being comparatively cool, they would communicate very little heat to hot water, whereas if they are in contact with cold water, much of their heat, which would otherwise escape up the chimney would be transmitted to the cold water.

Mr. Forney asked whether the fact that nearly all the evaporation of water by the tubes occurred at the first foot of their length had been clearly proved by experiment. The assertion had frequently been made, but he had never been able to find the authority on which it rested.

Mr. Hudson replied that he thought that a little pamphlet by Mr. C. Wye Williams contained an account of experiments which showed that such was the fact.

Mr. Forney said that the experiments made and reported by Mr. Williams, as he remembered them, were made without a forced blast such as is used in locomotives. He thought that in a boiler in which the draft was urged with the violence that existed in locomotive boilers, the results of the experiments would be very different.

Mr. Lewis had used a small Cope & Maxwell pump to feed some of his locomotive boilers, and had never found any injurious effects from admitting the water at the fire-box.

Mr. Fry suggested that if Mr. Lewis was correct, it may be that it is desirable, owing to defective circulation, to admit the water at the hottest part of the boiler.

Mr. Hudson had known of engines in which the water was admitted at the fire-box, and it caused the tubes to leak. The check was then placed at the front end of the boiler, and no further difficulty was experienced. Cold water carried off the heat too fast, and caused sudden contractions of the parts previously heated to a very high temperature.

Mr. Robinson said that in the old country he had known of engines built by Sharpe, Stuart & Co., in which the water was delivered into the water-leg of the fire-box, without any injurious effects, whereas the water spaces were rapidly filled with scale and dirt when the water was admitted at the front end.

Mr. Sedgley had applied injectors to some engines and had found them very efficient. He was not able to give figures, but the men who run the engines thought they were saving fuel by their use.

Mr. Clark, of the Northern Railroad of Canada, stated that the water on their road was bad. The boilers were supplied with pumps. He used auxilliary injectors on the back end and introduced the water at the fire-box.

Mr. Eddy said that 25 years ago he had worked pumps with eccentrics, and introduced the water at the back end of the fire-box and found considerable trouble from leaky tubes and broken stays. He changed the point of admission and had no further trouble.

Mr. Clark said the injectors used on his road were merely auxiliary, and there was no trouble admitting the feed at the back end.

Mr. Hudson said that injectors on engines sent to Cuba soon filled with lime and sediment. Injectors had advantages in feeding while standing. One difficulty he apprehended was that locomotive runners fed the boilers spasmodically, whereas a more regular feed would do better.

Mr. Fry inquired what the difference was in the temperature at various points in the boiler.

Mr. Forney moved that Mr. Fry be requested to find out and report at the next meeting.

Mr. Hayes had tried the temperature in the smoke-box of an engine on the Baltimore & Ohio Railroad some years ago, and found the maximum was about 800 degrees.

In the afternoon the report on boiler construction was read. It was a very lengthy document, about 80 pages, and occupied about four hours in the reading. The meeting adjourned soon after the reading of this report.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Missouri River, Fort Scott & Gulf.—At the annual meeting in Rosedale, Kan., May 3, the following directors were chosen: Sidney Bartlett, John A. Burnham, F. Gordon Dexter, J. N. A. Griswold, Ira Harris, W. A. Harris, H. H. Hunnewell, B. P. McDonald, Charles Merriam, Nathaniel Thayer, Wm. F. Weld.

Detroit & Bay City.—At the annual meeting in Detroit, May 10, the following directors were chosen: M. W. Taylor, G. F. Talman, J. J. Astor, Benj. Dunning, Benj. Cartwright, James F. Joy, C. C. Fitzhugh, Townsend North, C. K. Carpenter.

Atchison, Topeka & Santa Fe.—At the annual meeting in Topeka, Kan., May 12, the following directors were chosen: Daniel S. Gilmore, Emporia, Kan.; C. K. Holliday, D. L. Lakin, Topeka, Kan.; George Opdyke, New York; I. T. Burr, B. P. Cheney, Joseph Nickerson, Thomas Nickerson, F. H. Peabody, C. W. Pierce, Alden Speare, Ginery Twichell, G. B. Wilbur, Boston. The board elected officers as follows: President, Thomas Nickerson, Boston; Vice-President, F. H. Peabody, Boston; Secretary and Treasurer, Edward Wilder, Topeka, Kan.; Assistant Treasurer, G. R. Goodin, Boston.

Black River & Morristown.—At the annual meeting in Redwood, N. Y., recently, D. Bearup was chosen President and A. A. Holmes, Secretary. The road is leased to the Utica & Black River Company.

Schenectady Locomotive Works.—Mr. Swift, now Superintendent of the Dickson Manufacturing Company, has been appointed Superintendent of the Schenectady Locomotive Works, in place of Mr. Walter McQueen, resigned, and will take charge June 1.

Delaware & Hudson Canal.—The board has re-elected the old officers, as follows: President, Thomas Dickson, Scranton, Pa.; General Manager, Coe F. Young, Honesdale, Pa.; Secretary, G. S. Haight, New York; Treasurer, J. C. Hartt, New York.

Canada Southern.—Mr. M. D. Woodford, late of the Michigan Central, has been appointed Division Superintendent of the lines west of the Detroit River, with office at Toledo, O.

Panama.—Mr. Brandon Mozley, late Division Suderintendent on the Canada Southern, has been appointed General Manager of the Panama Railroad.

St. Paul & Dakota.—The officers of this new company are as follows: President, H. E. Thompson; General Manager, J. W. Bishop; Secretary, George A. Hamilton.

Pensacola & Perdido.—At the annual meeting in Pensacola, Fla., May 4, the following directors were chosen: B. F. Simmons, O. H. Queal, A. E. Maxwell, F. C. Brent, A. Ferguson. Mr. B. F. Simmons is President.

Grand Trunk, of Canada.—At the half-yearly general meeting in London, England, April 29, Sir James Ramsden, Mr. Kirkman D. Hodgson, M. P., Mr. Grosvenor Hodgkinson and Capt. Tyler were re-elected directors by a unanimous vote.

New York & Oswego Midland.—Mr. J. F. Mackie, General Superintendent, having resigned, the office is abolished and the division superintendents will report directly to Mr. J. G. Stevens, Receiver and General Manager. Mr. C. W. Tampper is continued as Superintendent of the Northern Division, and Mr. T. P. Purdy, formerly of the Montclair road, is appointed Superintendent of the Southern Division.

Windsor & Forest Line.—At the annual meeting recently the following directors were chosen: J. H. Dickey, Acworth, N. H.; Hosea W. Parker, R. W. Love, Claremont, N. H.; Mark N. Spaulding, Hancock, N. H.; Hiram Parker, Lempster, N. H.; James Burnap, James Q. Jones, Marlow, N. H.; Virgil C. Gilman, Josiah G. Graves, Theodore H. Wood, Nashua, N. H.; Christopher Robb, Stoddard, N. H. Mr. Otis F. R. Waite, of Claremont, N. H., was chosen Clerk.

Gulf, Western Texas & Pacific.—Capt. Henry Sheppard has been chosen President, Superintendent and Chief Engineer, in place of Mr. Richard J. Evans, resigned. Captain Sheppard has been agent for the Morgan steamship line at Indianola, Texas.

New York & Harlem.—At the annual meeting in New York, May 16, the old board was re-elected, as follows: Cornelius Vanderbilt, Wm. H. Vanderbilt, Cornelius Vanderbilt, Jr., Wm. C. Wetmore, Augustus Schell, A. B. Bayles, James H. Banker, John B. Dutcher, Joseph Harker, Robert J. Niven, Cornelius M. Meserole, Chauncey M. Depew, Wm. H. Leonard.

Pittsburgh & Northwestern.—At a meeting of the board held May 12, Messrs. J. Pearce, J. D. Lytle and H. Wells presented their resignations, and Hugh Fleming, Reuben Miller and J. J. Gillespy were chosen directors in their stead. Some more changes will be made soon.

Greenville, Columbus & Birmingham.—Col. E. Pratt Buell is now General Manager of this company, whose headquarters are, for the present, at Winona, Carroll County, Miss.

Cairo & Vincennes.—Mr. Charles Sawyer has been appointed General Freight and Ticket Agent. He was formerly connected with the Baltimore & Ohio.

Atlantic & Pacific Telegraph.—The new board has elected the following officers: Thomas T. Eckert, President; W. J. Syms, First Vice-President; Albert B. Chandler, Second Vice-President and Secretary; Alfred Nelson, Treasurer.

Ashuelot.—At the annual meeting in Keene, N. H., May 9, the following directors were chosen: Alfred T. Colony, Henry Colony, John E. Colony, Samuel W. Hale, Elisha F. Lane, F. F. Lane, George F. Lane.

Montclair & Greenwood Lake.—Mr. W. E. Dorwin has been appointed Superintendent, with office in Jersey City, N. J. He was at one time Assistant Superintendent of the Toledo, Peoria & Warsaw.

Manchester & Keene.—Mr. B. F. George, of Nashua, N. H., has been appointed Chief Engineer.

Chicago, Burlington & Quincy.—Mr. W. Beckwith, General Superintendent of Track and Bridges, has been placed in charge of the Building Department also. That department has been heretofore under the supervision of Mr. W. W. Wilcox, Superintendent of the Car Department.

Cheshire.—At the annual meeting in Keene, N. H., May 10, the following directors were chosen: John Henry Elliott, Samuel Gould, John B. Meer, E. Murdock, Jr., Wm. A. Russell, Edward C. Thayer, George F. Williams. The board re-elected E. Murdock, Jr., President.

Selma, Marion & Memphis.—The United States Circuit Court has appointed A. A. Coleman Receiver.

Fort Scott, Winfield & Western.—The first board of directors is as follows: J. B. Lyon, M. L. Robinson, Winfield, Kan.; E. S. Cummings, D. H. Haines, Elk Falls, Kan.; I. Hudson, O. S. Small, Fredonia, Kan.; J. Bowsher, Homer Reed, George M. Shelly, Kansas City, Mo.

Lake Erie, Evansville & Southwestern.—At the annual meeting in Evansville, Ind., May 11, the following directors were chosen: Samuel Bayard, George L. Dixon, Thomas E. Garvin, J. B. Hudspeth, R. Pattison, Evansville, Ind.; W. H. H. Dye, Troy, O.; J. N. McBeth, Bellefontaine, O.; H. B. Henson, Saratoga, N. Y.; George T. M. Davis, N. H. Decker, George H. Ellery, T. H. Mason, New York. The board re-elected George H. Ellery, President; R. Pattison, Vice-President and General Superintendent; W. Hart Smith, of New York, Secretary and Treasurer; George C. Weaver, of Evansville, Assistant Secretary; John H. Bush, Chief Engineer.

East River Bridge.—Mr. Charles J. Canda, of New York, has been appointed a director in place of F. K. Thurber, resigned.

Pennsylvania Company.—The following general order has been issued, bearing date May 12:

"Mr. Thomas D. Messler has this day been elected Third Vice-President of this company.

"He will continue to act as Comptroller, and will discharge such other executive duties as the President or board may from time to time assign to him.

"His office will be at Pittsburgh, Pa."

Pittsburgh, Cincinnati & St. Louis.—The following circular bears date May 12:

"Mr. Thomas D. Messler has this day been elected Assistant to the President of this company.

"He will continue to act as Comptroller, and will discharge such other executive duties as the President or board may from time to time assign to him.

"His office will be at Pittsburgh, Pa."

Central Vermont.—At the annual meeting in St. Albans, Vt., May 17, the following directors were chosen: J. Gregory Smith, W. C. Smith, St. Albans, Vt.; Joseph Clark, Milton, Vt.; Jacob Esty, Brattleboro, Vt.; Laurence Barnes, Burlington, Vt.; G. M. Rice, Worcester, Mass.; J. Q. Hoyt, New York; B. P. Cheney, Francis Coxe, Jacob Edwards, James W. Emery, Boston. This is the same as the "Smith board" chosen last year; except that Mr. Emery takes the place of Ex-Gov. Page.

St. Louis, Salem & Little Rock.—At the annual meeting in Steelville, Mo., May 5, the following directors were chosen: A. L. Crawford, H. A. Crawford, Wm. Brewster, J. M. Orchard, W. L. Scott. The board re-elected A. L. Crawford, President; W. L. Scott, Vice-President; Wm. Brewster, Secretary and Treasurer; E. L. Foot, Assistant Secretary; J. W. Blanchard, General Superintendent; E. B. Sankey, General Freight Agent; H. A. Crawford, Purchasing Agent.

Oregon & California.—At a meeting of the board held in Portland, Or., last week, the positions of Ben. Holladay and W. L. Halsey as directors were declared vacant, for the reason that they owned no stock. The board elected H. Villard,

President; R. Koehler, Vice-President; A. G. Cunningham, Secretary and Treasurer.

Kent County.—At the annual meeting in Chestertown, Md., May 8, the following directors were chosen: G. B. Bingham, Samuel Casey, Frederick Gerker, A. Hurley, R. Nicholson, Thomas Shallcross, J. L. Stam. The board elected J. L. Stam President.

Indianapolis & Vincennes.—At the annual meeting in Indianapolis, May 11, the following directors were chosen: H. H. Huston, Indianapolis; W. H. Barnes, J. N. McCullough, Thomas D. Messler, Wm. Thaw, Pittsburgh; George B. Roberts, Thomas A. Scott, Philadelphia. The board reappointed D. W. Caldwell General Manager; E. W. McKenna, General Superintendent; J. A. Perkins, General Freight Agent.

PERSONAL.

—Mr. A. E. Swazey, late Superintendent of the Taunton Branch Railroad, died at his residence in Taunton, Mass., April 29, in the 66th year of his age. He was Superintendent of the road from its opening in 1836 up to the consolidation with the New Bedford & Taunton road in 1874, holding his office longer than any other railroad superintendent in the United States.

—Mr. Oliver Moses having announced his intention of resigning the position of President of the Knox & Lincoln Railroad Company, the City Council of Bath, Me., which city is one of the principal stockholders, has requested him to reconsider his decision and retain the office.

—Mr. Walter McQueen will retire from the position of Superintendent of the Schenectady Locomotive Works June 1. He has been connected with the works over 24 years and has had charge of the construction of more than 1,000 locomotives. It is understood that Mr. McQueen will retire altogether from active business.

—Mr. W. K. Ackerman, Auditor of the Illinois Central, was on a train on that road which was recently blown from the track by a tornado near Neoga, Ill. He was badly, though not dangerously, hurt and will be confined to his bed for a month.

—Mr. J. F. Mackie has resigned the position of General Superintendent of the New York & Oswego Midland, which he has held but a short time, since the death of Mr. E. S. Flint. He was connected with the road for some time previously, having been Superintendent of the Northern Division.

—Judge W. L. Stewart, of Logansport, Ind., for several years Attorney for the Toledo, Wabash & Western Railway, died May 7, while on a visit to Clifton Springs, N. Y.

—Col. A. C. Dawes, General Passenger Agent of the Kansas City, St. Joseph & Council Bluffs road, was last week on trial in the United States Court at Jefferson City, Mo., on charges of complicity in the whiskey frauds. After a protracted trial he was acquitted.

—Many American engineers and railroad men will regret to hear of the death, at his home in Russia, about a year ago, of Mr. E. N. Zaika, who visited this country in 1872 and made a special study of American locomotives and some other railroad appliances. Mr. Zaika was an extremely intelligent young man, and his frank, hearty and kindly manners quickly made friends of those with whom he was associated.

—In a letter to the New York *Times*, Colonel Thomas A. Scott contradicts a statement made that his election to the presidency of the Union Pacific some years ago was in consideration of a loan of its credit to the extent of $10,000,000 made by the Pennsylvania Railroad Company. He says that his connection with the Union Pacific was altogether outside and independent of the Pennsylvania. In his testimony before a Congressional Committee, Colonel Scott said that, as a sort of compensation for extra services, in addition to his salary, the Union Pacific Company bought of him a large amount of Little Rock & Fort Smith bonds at a price much above the then market rate. It had been rumored that these bonds had been purchased of Speaker Blaine, and the report was made to injure Mr. Blaine's prospects for a nomination for the Presidency. With regard to the morality of such a sale by the President of a railroad to his own company, it is perhaps fair to bear in mind that the purchase was made by the board of directors, and that this board probably owned nearly all the company's shares.

—Mr. Richard J. Evans has resigned his position as President, Superintendent and Chief Engineer of the Gulf, Western Texas & Pacific Railroad, which he has held since the commencement of operations on the road in 1871. Mr. Evans has been connected with various railroads in Louisiana and Texas for 15 years past. He is now out of employment and solicits correspondence with a view to securing an engagement. Mr. Evans' present address is at Cuero, De Witt County, Texas.

—Hon. Wm. H. Barnum, who is President of the Connecticut Western and the Housatonic Railroad companies and the Barnum-Richardson Manufacturing Company and is largely interested in other railroad and manufacturing companies, has been elected United States Senator from Connecticut. He has been a Representative in Congress from that State for seven years past.

—Mr. Isaac Spalding, President of the First National Bank of Nashua, N. H., who died in that city May 14, aged 80 years, was one of the projectors and first stockholders of the Concord Railroad Company, and remained a large holder until his death. He served the company as Treasurer, President and director for 31 years, from 1835 to 1866, and did much towards making it a successful and wealthy corporation. He left a large property, having been for many years past reputed to be the richest man in New Hampshire.

—Mr. J. Newton Perkins, at one time Treasurer of the Illinois Central Company, and a member of the banking firm of Winslow, Perkins & Co., now Winslow, Lanier & Co., died at Irvington, N. Y., May 14. Of late years he had been unsuccessful in business and he died poor.

TRAFFIC AND EARNINGS.

Coal Movement.

Coal tonnages are reported as follows for the week ending May 6:

	1876.	1875.	Inc. or Dec.	P. c.
Anthracite	402,053	265,231	Inc. 136,822	51.6
Semi-bituminous, Broad Top and Clearfield	31,004	18,924	Inc. 12,080	63.9
Cumberland	38,514	61,602	Dec. 23,088	37.5
Bituminous, Barclay	4,943	3,839	Inc. 1,104	28.8
" Western Pa.	32,534	35,177	Dec. 2,643	7.5

At a meeting of the anthracite combination in Pottsville, May 11, it was decided to keep down shipments and maintain present prices. The Lehigh Valley, which has been suspected of a desire to draw out of the combination, has consented to keep its tonnage within the prescribed limits.

The Tennessee Coal & Railroad Company mined and shipped during the year 1875 3,676,586 bushels (131,307 tons) of coal and coke, an increase of 916,768 bushels, or 33.2 per cent., over 1874. The average price realized was 7.52 cents per bushel against 9.10 cents in 1874; the average cost, delivered at Cowan, on the Nashville, Chattanooga & St. Louis road, was 5.62 cents against 6.41 cents; net profit in 1875, 1.90 cents per bushel and in 1874, 2.69 cents.

Ocean Freights.

Last Tuesday there were contracts from New York at 7d. per bushel for grain by sail to Liverpool, 7½d. to Bristol, 7¼ to 7¾ to London, and 8¾d. by steam to London; at 50s. for cheese, 40s. for bacon, per ton by steam to Liverpool; at 5s. 6. per barrel for pork by steam to Liverpool, and 5s. 9d. to London; at ¼d. per pound for cotton by sail to Liverpool; at 3s. 3d. per barrel for refined petroleum by sail to Antwerp, 3s. 4½d. for other Atlantic European ports, and 4s 3d. to Baltic ports.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1875-76.	1874-75.	Inc. or Dec.	P. c.
Year ending March 31:				
Georgia	$1,194,324	$1,281,907	Dec. $87,583	6.8
Expenses	641,678	826,098	Dec. 184,420	22.3
Net earnings	$552,646	$455,809	Inc. $96,837	21.2
Earnings per mile	5,238	5,622	Dec. 384	6.8
Per cent. of expenses	53.73	64.44	Dec. 10.71	16.6
Macon & Augusta	108,090	115,451	Dec. 7,361	6.4
Expenses	94,254	103,364	Dec. 9,110	8.8
Net earnings	$13,836	$12,087	Inc. $1,749	14.5
Earnings per mile	1,386	1,480	Dec. 94	6.4
Per cent. of expenses	87.20	89.53	Dec. 2.33	2.6
Pensacola & Perdido	36,975	23,893	Inc. 13,082	54.7
Expenses	13,195	12,102	Inc. 1,093	9.0
Net earnings	$23,780	$11,791	Inc. $11,989	101.7
Earnings per mile	4,108	2,655	Inc. 1,453	54.7
Per cent. of expenses	35.69	50.65	Dec. 14.96	29.5
Four months ending April 30:				
Atchison, Topeka & Santa Fe	$640,751	$362,272	Inc. $278,479	43.5
Cairo & St. Louis	76,874	.....	.....	....
Canada Southern	598,785	318,804	Inc. 279,981	87.8
Central Pacific	4,562,000	4,373,344	Inc. 188,656	4.3
Chicago & Alton	1,961,505	1,379,729	Dec. 18,224	1.3
Chicago, Milwaukee & St. Paul	2,263,332	1,931,808	Inc. 331,524	17.2
Denver & Rio Grande	127,399	102,686	Inc. 24,653	24.0
Illinois Central	2,348,148	2,278,650	Inc. 69,458	3.0
Ind., Bloom. & West	509,856	425,555	Inc. 84,301	19.8
Michigan Central	2,260,915	2,153,802	Inc. 107,113	5.0
Missouri, Kan. & Texas	971,784	820,480	Inc. 151,304	18.3
Ohio & Mississippi	1,229,853	1,074,321	Inc. 155,532	14.5
Pacific, of Missouri	1,183,956	951,388	Inc. 232,568	24.4
St. Louis, Alton & Terre Haute, Belleville Line	157,974	202,732	Dec. 44,758	22.1
St. Louis, Iron Mountain & Southern	1,219,057	1,083,963	Inc. 135,094	12.5
St. Louis, Kansas City & Northern	1,034,210	868,926	Inc. 165,284	19.0
Tol., Peoria & Warsaw	432,228	280,860	Inc. 151,368	53.9
Three Months ending March 31:				
Atchison, Topeka & Santa Fe	$441,796	$251,120	Inc. $190,676	75.9
Expenses	225,568	131,594	Inc. 93,974	71.4
Net earnings	$216,228	$119,526	Inc. $96,702	80.9
Per cent. of expenses	51.06	52.40	Dec. 1.34	2.6
Houston & Tex. Central	786,409	640,102	Inc. 146,307	22.9
Expenses	496,821	504,728	Dec. 7,907	1.6
Net earnings	$289,588	$135,374	Inc. $154,214	113.9
Per cent. of expenses	63.18	78.86	Dec. 15.68	19.8
Northern, of Canada	145,460	138,875	Inc. 6,585	4.7
Month of March:				
Atchison, Topeka & Santa Fe	$180,247	$104,052	Inc. $76,195	73.2
Expenses	85,580	46,001	Inc. 39,579	86.0
Net earnings	$94,667	$58,051	Inc. $36,616	63.0
Per cent. of expenses	47.48	44.21	Inc. 3.27	7.4
Louisville, Paducah & Southwestern	35,753	.....	.....	....
Expenses	31,508	.....	.....	....
Net earnings	$4,185	.....	.....	....
Per cent. of expenses	88.29	.....	.....	....
Great West'n, of Canada	$323,000	$380,390	Dec. $57,390	15.1
Expenses	265,600	331,984	Dec. 66,384	20.0
Net earnings	$57,400	$48,406	Inc. 8,994	18.6
Per cent. of expenses	82.23	87.27	Dec. 5.04	5.8
Month of April:				
Atchison, Topeka & Santa Fe	$198,955	$111,152	Inc. $87,803	79.0
Cairo & St. Louis	16,864	.....	.....	....
Canada Southern	168,452	106,755	Inc. 61,697	57.8
Central Pacific	1,468,000	1,366,984	Inc. 101,016	7.4
Chicago & Alton	353,530	367,955	Dec. 14,425	3.9
Chicago, Milwaukee & St. Paul	650,944	639,669	Inc. 11,275	1.8
Denver & Rio Grande	31,846	32,162	Dec. 316	1.0
Illinois Central	546,061	610,459	Dec. 64,378	10.5
Ind., Bloom. & West	130,308	102,876	Inc. 27,432	26.7
Michigan Central	610,543	600,066	Inc. 10,477	1.7
Mo., Kan. & Texas	214,788	192,471	Inc. 22,317	11.6
Ohio & Mississippi	306,637	273,441	Inc. 33,196	12.1
Pacific, of Missouri	283,732	253,779	Inc. 29,953	11.8
St. Louis, Alton & Terre Haute, Belleville Line	37,701	40,446	Dec. 2,745	6.8
St. Louis, Iron Mountain & Southern	283,547	275,352	Inc. 8,195	3.0
St. Louis, Kansas City & Northern	234,002	220,692	Inc. 13,310	6.0
Tol., Peoria & Warsaw	118,043	74,809	Inc. 43,234	57.8
First Week in May:				
Atchison, Topeka & Santa Fe	$48,996	$23,832	Inc. $25,164	105.7
Chicago & Alton	89,084	79,993	Inc. 9,091	11.4
Michigan Central	148,905	127,126	Inc. 21,679	17.1
Missouri, Kan. & Texas	43,142	38,753	Inc. 4,389	11.3
Ohio & Mississippi	82,417	65,590	Inc. 16,827	25.7
St. Louis, Iron Mt. & So.	67,300	56,275	Inc. 11,025	19.6
Second week in May:				
Chicago, Milwaukee & St. Paul	$167,000	$173,503	Dec. $6,503	3.7
Week ending April 28:				
Great West'n, of Canada	£18,657	£18,999	Dec. £342	1.8
Week ending April 29:				
Grand Trunk	£37,700	£35,900	Inc. £1,800	5.0
Week ending April 21:				
GreatWest'n, of Canada	£17,753	£19,811	Dec. £2,058	10.4
Week ending April 22:				
Grand Trunk	£40,100	£41,100	Dec. £1,000	2.4

Flour and Grain Movement.

San Francisco wheat shipments for April were as follows:

	1876.	1875.	Decrease.	P. c.
Flour, barrels	36,000	44,700	8,700	19.5
Wheat, bushels	357,500	649,833	292,333	45.0
Total bushels	519,500	850,983	331,483	39.0

The wheat all went to Great Britain. Of the flour, 19,600 barrels went to China and Japan, 11,500 barrels to Great Britain, 1,600 to Central America, and the balance to Siberia and the Pacific islands.

Chicago Grain Movement.

Receipts and shipments, in bushels for the week ending May 13 were:

	1876.	1875.	Inc. or Dec.	P. c.
Receipts	989,758	1,209,175	Dec. 219,317	18 2
shipments	2,281,214	1,519,037	Inc. 762,177	50.1

Compared with the previous week of this year, there is a decrease of 44 per cent. in receipts and an increase of 5 per cent. in shipments.

Petroleum Movement.

The shipments of petroleum from the oil region of Pennsylvania for April were as follows:

	Barrels.
By pipe line to Pittsburgh	105,380
By river " "	16,504
By railroad " "	37,976
Dunkirk, Warren & Pittsburgh R. R.	69,973
Lake Shore & Michigan Southern Ry.	86,496
Atlantic & Great Western R. R.	91,406
Pittsburgh, Titusville & Buffalo and Allegheny Valley to points other than Pittsburgh	162,013
Total	569,748

This shows the amount of crude in barrels of 42 gallons each, refined being reduced to crude. The total shipments for the four months ending April 30 were: 1876, 2,327,982 barrels; 1875, 2,253,406; increase, 74,576 barrels, or 3.31 per cent.

Pittsburgh Freight Rates.

The Pennsylvania and the Baltimore & Ohio have made the following rates on fourth class from Pittsburgh:

From Pittsburgh	Per 100 lbs.	Per 100 lbs. in car-loads.
To Baltimore	16½ cents.	14½ cents.
To Philadelphia	18½ "	16 "
To New York	23 "	20 "
To Providence	28 "	25 "
To Boston	28 "	25 "

This is a considerable reduction from the old rates.

THE SCRAP HEAP.

Railroad Manufactures.

The Baldwin Locomotive Works have two engines to build for the Virginia & Truckee road. They recently shipped three narrow-gauge engines for the Havana, Rantoul and Eastern road.

The Patten Car Works, at Bath, Me., have begun work on a large contract for passenger, second-class and baggage cars for the Montreal, Ottawa & Western Railway of Canada.

The Indianapolis Rolling Mill is at work on a contract to reroll 1,500 tons of rails for the Toledo, Peoria & Warsaw.

The New Albany Steam Forge has closed a contract to make 2,800 car axles for the Indianapolis, Bloomington & Western road.

Porter, Bell & Co.'s locomotive works at Pittsburgh are running full time. They recently shipped several dummies to New Orleans for use on a street railroad there.

The Co-operative Rolling Mill at Danville, Pa., started up May 1.

The Little Schuylkill Rolling Mill, at Port Clinton, Pa., is running full time, with a number of orders ahead.

During the week ending May 6 the Cambria Iron Company, at Johnstown, Pa., shipped 4,000 tons of steel and iron rails to fill orders.

The Wrought Iron Bridge Company, at Canton, O., has secured 15 contracts for bridges since April 1.

The King Iron Bridge Company at Cleveland turned out 23,045 lineal feet of iron bridges during 1875.

At the steel works of Bolton, Myers & Co., Youngstown, O., a new Siemens-Martin open-hearth furnace is being built.

The Tennessee Iron & Steel Company has been organized at Chattanooga, Tenn., the incorporators being Louis Schofield, John C. Peck, Wm. Markham, Louis Schofield, Jr., Georgia; O. L. Packard, of Missouri; J. W. McCrath, E. A. James, Clinton R. Gaskill and Dr. J. N. McClain, of Chattanooga.

The Grant Locomotive Works at Paterson, N. J., have received an order for two engines for the San Francisco & North Pacific road, and are negotiating for a contract for 10 heavy freight engines.

In the ten months ending March 31, 1876, Bangor Furnace in Van Buren County, Mich., made 10,516 net tons of iron. The furnace was idle during that time 5 days and 9 hours for repairs. It is 9½ feet bosh and uses charcoal and Lake Superior ore.

Rapid Bridge Building.

The contract for rebuilding the bridge over Narrow Passage River, on the Harper's Ferry & Valley Branch of the Baltimore & Ohio Railroad, was awarded to the Keystone Bridge Company, to be completed in 40 days from date of contract. The bridge consists of four deck spans, two of 103 feet and two of 128 feet; total length, 462 feet; single intersection pin-connection, wrought-iron cross girders and wrought-iron stringers. The contract was signed on the 20th of March, 1876, and the trains crossed on the new iron bridge on the 1st of May. The rapidity of the construction and erection of the bridge was due to the energy and promptness of General Manager J. L. Piper, at the shops, and Assistant General Manager, A. G. Shiffler, at the bridge site.

Petroleum in Locomotives.

Any persons who have made experiments with petroleum as fuel for locomotives, or have definite knowledge of such experiments and their results, will confer a favor by communicating with Mr. Paul Michailoff, Engineer, who for the past year has been studying our harbor works and water communications under a commission for the Russian Government, and is now instructed to collect information on this subject. Russia now has railroads in the Caucasus, and is building more, where there is scarcely any wood or coal, but an abundance of petroleum, for which there there is now no market. It has been used successfully as fuel for steamboat engines, but the experiments there with locomotives were not so successful as could be desired. Under the circumstances, a consumption of oil which would make it much more costly than coal in this country, where fuel is abundant, might be advantageous there. Mr. Michailoff may be addressed at the Lapierre House, Philadelphia, until June 1, when he will sail for Europe.

More Fast Time.

The Albany *Argus* of May 9 says: "The fastest time that has been made on the Central-Hudson railroad with the fast mail train since it has been on the road was that made with the eastward bound train Sunday evening by locomotive No. 386 in charge of Fred. H. Horstman, engineer, and C. M. Waleigh, fireman. The train left Syracuse 57 minutes late and arrived in this city three minutes ahead of card time, the train having struck its regular time at Schenectady. The run from Syracuse to Utica, distance 53 miles, was made in 66 minutes, or nineteen minutes faster than the regular running time. From Utica to Fonda, distance 51 miles, the run was made in 70 minutes, or 18 minutes faster than the card time. From Fonda to this city, distance 44 miles, the run was made in 57 minutes, or 20 minutes faster than the regular running time. From these figures it is seen that the run from Syracuse to Albany, distance 147¼ miles, was made in three hours and eighteen minutes. Deducting from this seventeen minutes lost in stops at Utica and Palatine Bridge, and the 147¼ miles are found to have been run in 181 minutes. This is not only the fastest time that has been made with this train on this road, but upon any road in the whole country through which the fast mail passes."

RAILROAD LAW.

Bridge-builders' Liens and First Mortgages.

In the United States Circuit Court at Louisville, Ky., some time since the trustees under the first mortgage filed a bill in foreclosure against the Louisville, Paducah & Southwestern

Railroad, and at the same time the Baltimore Bridge Company brought suit to establish a prior (mechan c's) lien on certain bridges built by it for the road. Recently the Court granted the decree of foreclosure and sale asked for, but refused to allow the mechanic's lien of the Bridge Company, holding that the latter could only sue as an ordinary creditor of the company. The Bridge Company gave notice of appeal to the United States Supreme Court.

New Jersey Railroad Law.

An amendment to the general railroad law passed by the late Legislature of New Jersey provides that any railroad company operating a route between two termini, a part of which route is made up by a steam ferry, may, at its discretion, abandon the steam ferry or steamboat part of the route and operate the railroad alone; provided, however, that it must provide by lease, purchase or construction, a rail route by which freight and passengers can be carried as quickly and conveniently between the termini of the line as they were before by the steam-ferry. Companies are allowed until Jan. 1, 1877, to provide such rail route.

This law, though general in its terms, was really specially framed to permit the Pennsylvania Railroad Company to abandon the steamboat line between South Amboy and New York, which was an essential part of the Camden & Amboy Line by its original charter.

ANNUAL REPORTS.

South Carolina.

This company owns and operates the following lines:

	Miles.
Charleston, S. C., to Augusta, Ga	137
Branchville, S. C., to Columbia	68
Kingsville, S. C., to Camden	37
Total	242

It is the chief carrier to Charleston from all that part of the State west and northwest of that city, and through the Greenville & Columbia road (which it controls) and its connections it secures a great part of the traffic from the hill country of South Carolina, its only rival in that direction being the Atlanta & Richmond Air Line.

At the close of the year covered by the report, Dec. 31, 1875, the equipment consisted of 44 engines, of which 30 were in good, 4 in ordinary and 9 in bad order, and one was being rebuilt; 23 first and 26 second-class passenger cars; 409 box, 14 stock and 124 platform cars. During the year 30 box and 7 platform cars were built and 20 box cars charged off as destroyed. Three engines were added to the equipment. Of the nine engines reported in bad order five are old ten-wheelers so nearly worn out that it is not intended to repair them.

In addition to the road and equipment the company owns shares in steamship companies inventoried at $278,447, and in other railroad companies at $297,795. Of the latter, however, $19,400 have been charged off as worthless since the close of the year.

The credit side of the capital account stands as follows:

Stock ($24,047 per mile)	$5,819,275 00
Bonds ($18,967 per mile)	4,590,089 91
Bills payable	1,326,025 38
Fare tickets, change notes, loan account, etc	128,754 83
Coupons accruing	124,923 92
Profit and loss and transient creditors	140,319 67
Total	$12,129,388 71

The debt account, after deducting the inventoried value of securities owned, cash on hand, advances and balance due, shows a net balance of debt against the company of $3,794,132 86, or $15,678 per mile.

The work of the year was as follows:

	1875.	1874.	Inc. or Dec.	P. c.
Train mileage	888,792	857,270	Inc.. 31,522	3.7
Passengers carried	158,735	171,118	Dec.. 12,383	7.2
Tons freight moved east	138,492	151,673	Dec.. 13,181	8.7
Tons freight moved west	123,188	118,605	Inc.. 4,583	3.9
Total tons moved	261,680	270,278	Dec.. 8,598	3.2

The average receipt per ton carried was as follows:

	1875.	1874.	Decrease.	P. c.
Average receipt	$3.75	$4.15	$0.40	9.6
" cost	2.24	2.36	0.12	5.1
" net receipt	$1.51	$1.79	$0.28	15.6

The receipts of leading articles of freight at Charleston and the shipments of fertilizers from that port were as follows:

	1875.	1874.	Inc. or Dec.	P. c.
Bales cotton	296,245	343,786	Dec..47,541	13.8
Barrels flour	58,345	72,659	Dec..14,314	19.7
Bushels grain	171,776	218,427	Dec..46,651	21.4
Bales domestics	24,375	25,294	Dec.. 919	3.5
Barrels naval stores	43,872	48,956	Dec.. 5,084	10.4
Head live stock	12,133	12,597	Dec.. 464	3.7
Tons fertilizers	36,157	31,283	Inc... 4,874	15.6

Short production was one cause of the decrease in tonnage; another was the war between the trunk lines in the early part of the year, by which large quantities of grain and provisions were diverted from the Green Line route and sent to Baltimore and thence by steamer. The latter cause increased the westbound tonnage from Charleston, but not sufficiently to make up for the loss on east-bound freight.

The earnings of the year were as follows:

	1875.	1874.	Inc. or Dec.	P. c.
Passenger	$229,231 30	$226,016 06	Inc. $3,205 24	1.4
Freight	981,905 44	1,121,779 95	Dec. 139,874 51	12.5
Mails	18,176 10	18,176 10		
Total	$1,229,302 84	$1,365,972 11	Dec. $136,669 27	10.0
Working expenses	780,727 89	850,515 42	Dec. 69,787 53	8.2
Net earnings	$448,574 95	$515,456 69	Dec. $66,881 74	13.0
Gross earn per mile	$5,080	$5,645	Dec. $565	10.0
Net " " "	1,854	2,130	Dec. 276	13.0
Per cent. of exps	63.50	62 26	Inc. 1.24	2.0

Of the freight earnings 23.9 per cent. were from through business to and from Charleston; 70.8 per cent. from local business to and from Charleston, and 5.3 per cent. from business outside of Charleston.

The net results of the year were as follows:

Net earnings of road	$448,474 95
Incidental income	1,431 14
Total net income	$450,005 09
Interest on bonds and floating debt	438,328 18
Balance of profit	$11,676 91

While the results of the year have not been very favorable the road and equipment have been maintained in good condition, and the company has been enabled to meet all its obligations. The year has been one of unusual hardship to Southern companies, and the share borne by the South Carolina has been less than that of some others. The traditional policy of the company has been maintained and the strictest economy consistent with good management has been practiced.

In repairs of road 1,385 tons iron rails and 121,701 new ties have been used. The long trestles on the Columbia and Camden lines have been rebuilt in an enduring manner, and the only important work of this kind which will require attention for several years will be the long trestle over the Wateree Swamp. A large amount of ballasting has been done and the track is in good condition.

OLD AND NEW ROADS.

Galveston, Houston & Henderson.

The change of gauge of this road from 5 feet 6 inches to 4 feet 8½ inches is to be made on or about Aug. 5, that date having been fixed upon by the board. The necessary preparations are now being made. As elsewhere noted, the remaining broad gauge section of the Houston & Texas Central's main line is to be changed at the same time.

The change of this road will be of great advantage to the road and also to the lines centering at Houston and the Galveston, Harrisburg & San Antonio, which connects with it at Harrisburg. The cars of those roads can thereafter be hauled through to the wharves of Galveston without any of the delay and expense now caused by the transshipment of freight or the change of car-trucks at Houston, which is now necessary.

Houston & Texas Central.

This company has resolved to change the 120 miles of its main line from Houston, Tex., to Hearne from its present gauge of 5 feet 6 inches to the standard 4 feet 8½ inches. The remainder of the main line is already of the standard gauge. The Western Division, from Hempstead to Austin, 115 miles, will still be of the wide gauge and will be the only line of that gauge remaining in Texas. It is intended to change that also hereafter, but the alteration will not be made until the remaining wide gauge engines of the company are worn out. Arrangements have been made to make the change of the main line about the same time as that of the Galveston, Houston & Henderson, which is to take place Aug. 5.

Rockford, Rock Island & St. Louis.

The Auditor reports earnings for March as follows:

Passengers	$19,968 44
Freight	36,689 99
Other sources	3,677 01
Total earnings ($207 per mile)	$60,335 34
Working expenses (77.25 per cent.)	46,606 51
Net earnings ($47 per mile)	$13,728 83

There has been paid since November last $10,856.17 for miscellaneous purposes and $10,310.22 for interest. There are still some outstanding liabilities for balances due other roads and for damages, and about $2,000 is due from other roads and for mail service.

In the United States Circuit Court in Chicago, May 11, Judge Drummond refused the application of Mr. Osterberg for a personal deed of the road under the foreclosure sale, but stated that a deed would be given to him as trustee for the bondholders, provided the Court was convinced by an examination of his accounts, which has been ordered, that he is a proper person to be entrusted with such deed.

After hearing testimony, the Master reported to the court that he had found Mr. Osterberg's accounts correct, but that counsel had made objections to certain vouchers signed by Osterberg only, and to certain items which were not supported by any vouchers. The court said that argument would be heard on those objections this week.

The court also ordered that the supplemental bills filed by Miss J. M. Hooper and T. L. Robinson be allowed to stand together as a new bill and petition, and that Osterberg enter his appearance to the same as to an original proceeding.

It is said that arrangements have been completed for the transfer of the road to the new organization known as the St. Louis, Rock Island & Chicago Company, as soon as the trust deed is executed. The new company will put two mortgages on the road, a first mortgage for $260,000 to secure the loan made from the Austrian-German Bank of Frankfort, to complete the purchase, and a second mortgage for $1,000,000, the bonds to be issued to the old bondholders for the 20 per cent. assessment paid by them.

Texas & Pacific.

The new bill which Mr. Throckmorton, of Texas, has prepared as a substitute for that of the Pacific Railroads Committee of the House of Representatives, extends the time for the completion of the road eight years, on condition that the company, within one year from the passage of the bill, shall complete the main line to Fort Worth and the Transcontinental Division from Paris to Texarkana; shall within one year thereafter build 50 miles of the Transcontinental Division from Sherman towards Fort Worth; shall, in the first year, build 20 miles of road from San Diego, Cal., eastward, and not less than 20 miles additional in each year thereafter. The bill also provides that homestead and pre-emption entries heretofore made on public lands shall be held not to be included in the company's grant, and that compensation for such exceptions shall be made to the company, as now provided by law. The company is required to signify its acceptance of the law within six months of its passage.

Cincinnati, Wabash & Michigan.

The track is now laid to Anderson, Ind., 11 miles south of the late terminus at Alexandria, making the road 114 miles long, from Goshen to Anderson. The track has been put in good order and a connection made with the Pittsburgh, Cincinnati & St. Louis road at Anderson. Trains began to run to that point May 15. Arrangements have been made to run through cars from Goshen to Indianapolis and Cincinnati.

Central, of Iowa.

At the special meeting, held May 13, the bondholders voted to remove the Farmers' Loan & Trust Company from the trusteeship of both the first and second mortgages. The charges made were carelessness in permitting an over-issue of bonds and in protecting the interests of bondholders, and neglect or refusal to co-operate with the committee representing the bondholders.

New York Elevated.

The New York Court of Common Pleas May 16 granted, on application of the Ninth Avenue Railroad Company, a temporary injunction restraining this company from making any additions or sidings to its road, and also an order to show cause why it should not be restrained from operating its existing road. The order is returnable May 25. The petition claims that the construction and operation of the road interfere with the vested rights of the petitioner. The second track in the upper part of the city rests on posts in the roadway of the street, and not at the curbstone, as in the old road.

Wheeling & Lake Erie.

It is said that the board will accept a proposal made by Richie & Co., of New York, to complete and equip the entire line for $18,000 per mile. Meantime General McKee, who has a contract for the grading of a section, has been pushing work on a tunnel and some heavy cuts near Hopedale, O.

Eastern Counties.

The Government of Nova Scotia invites tenders from any party or corporation willing to construct this road from New Glasgow, N. S., to the Strait of Canso, about 75 miles; and in Cape Breton Island from the Strait of Canso to a point on the Bras d'Or Lake, about 35 miles. The two lines are to be connected by a steam ferry about a mile long across the Strait. The Government offers as a bonus 150,000 acres of land, and the Dominion Government has agreed to transfer to the builders of the new road the branch of the Intercolonial from Truro to Pictou, 52 miles, which has a considerable traffic, especially in coal. Tenders will be received until July 4.

Meetings.

The following companies will hold their annual meetings at the times and places given:

Boston & New York Air Line, at the office in Middletown, Conn., June 6, at 2 p. m.

Chicago & Northwestern, at the office in Chicago, June 1, at 1 p. m.

St. Louis, Alton & Terre Haute, at the office in St. Louis, June 5, at 3 p. m.

Illinois Central, at the office in Chicago, May 31, at 1 p. m.

Chicago, Milwaukee & St. Paul, at the office in Milwaukee, June 5, at noon.

United New Jersey Railroad & Canal, at the office in Trenton, N. J., May 30, at noon.

Chesapeake & Delaware Canal, at the office, No. 528 Walnut street, Philadelphia, June 5, at 11 a. m.

Columbus, Chicago & Indiana Central, at the office in Columbus, O., June 7, at 11 a. m.

Counterfeit Railroad Tickets.

For some weeks past it has been known in St. Louis that counterfeit railroad tickets were in circulation and detectives finally traced them to J. A. Brolaski, a clerk in the Illinois & St. Louis Bridge Company's office. He was arrested, and in his rooms were found a number of plates, dies, stamps, etc., and about $10,000 worth of tickets. A confede ate named Edwin M. Baker escaped. The counterfeit tickets are coupon tickets from Lawrence, Kan., to New York, over the Missouri Pacific, Chicago & Alton, Lake Shore & Michigan Southern and Erie roads; also from Topeka, Kan., to Philadelphia, over the Atchison, Topeka & Santa Fe, Missouri Pacific, Ohio & Mississippi, Pittsburg, Cincinnati & St. Louis and Pennsylvania roads.

Columbus, Chicago & Indiana Central.

In the suit between this company and the Pittsburgh, Cincinnati & St. Louis Company, lessee, the United States Circuit Court for Indiana has entered an order directing the lessee to pay over to the receivers of the Columbus, Chicago & Indiana Central the sum admitted by it to be the net earnings of the road for the year 1875 on or before June 1; also after that at the beginning of each month, the amount of net earnings for the month expiring ninety days previous to the date of payment. The sums so paid are to be used by the receivers to pay interest on the bonds having a lien prior to the first consolidated mortgage.

Erie.

The earnings for the month of February are reported by *Herapath's Railway Journal*, of London, as follows:

	1876.	1875.	Inc. or Dec.	P.c.
Gross earnings	$1,153,532	$1,101,631	Inc.. $51,901	4.7
Working expenses	906,395	905,093	Inc.. 1,302	0.1
Net earnings	$247,137	$196,538	Inc.. $50,599	27.7
Per cent of expenses	78.56	82.16	Dec.. 3.58	4.4

Eastern.

At the special meeting in Boston, May 16, the stockholders voted to accept the law authorizing the company to settle with its creditors by the issue of new bonds according to the plan heretofore approved. A motion to appoint a committee to bring suit against directors or officers charged with being derelict while in the service of the company was referred to a future meeting.

Billerica & Bedford.

The preliminary surveys have been completed for this road from the Middlesex Central depot at Bedford, Mass., through Billerica Center to North Billerica, about seven miles. It is proposed to make the road of 2-feet gauge, according to plans proposed by Mr. George E. Mansfield, of Boston. The equipment, drawings for which have been already made, is to be light, but of sufficient capacity. The committee appointed to get subscriptions to the stock has already secured a considerable amount on the line of the road. The estimated cost of the road complete is $40,000.

Keokuk, Iowa City & Minnesota.

Negotiations are on foot for the transfer of the partly graded road-bed of this road to the St. Louis, Keokuk & Northwestern Company, on condition that the latter company will complete and work the road.

Pittsburgh & Northwestern.

Several changes have been made in the board of directors, and some more are to be made shortly. The company has been much embarrassed, owing to the failure to keep their promises of some New York parties who agreed to take a large amount of its securities, but could furnish no money whatever when required to do so. New arrangements are now being made and the company hopes to be able to resume work soon.

Cairo & Tennessee River.

Surveys have been completed of the section from Mayfield, Ky., to Paris, Tenn., 36 miles, and of that from Paris to the Tennessee River, 30 miles. The section from Mayfield to Cairo, 40 miles, is also to be surveyed if Cairo and the towns on the line will contribute the necessary funds.

Chicago, Pekin & Southwestern.

Regular trains have begun to run through between Pekin and Chicago over this road and the Chicago & Alton. This road extends from Pekin northeast through Streator to the Mazon River, 91 miles, and it leases the right to run over the Chicago & Illinois River road, 22 miles further, to Joliet, where it connects with the Chicago & Alton. It is said that the road will be hereafter controlled by the Chicago & Alton.

Logansport, Crawfordsville & Southwestern.

In the suit begun last winter by Mr. C. W. Hassler, on behalf of the first-mortgage bondholders, a decree of foreclosure has been granted and the sale of the road ordered.

Central Pacific.

Anthony Coalet, a stockholder of this company, has filed a bill in equity against the company and its officers and directors, asking for an injunction to prevent the use of the funds of the company in paying interest on $1,600,000 California Pacific bonds, and also for a decree to the effect that the indorsement of the Central Pacific on such bonds is without authority and void. The principal object of the suit is said to be to prevent the completion of the settlement made with holders of California Pacific Extension bonds, and the issue of new bonds in accordance with that settlement.

A new survey has been made of the western end of the new branch from Galt, Cal., to Ione, and the route has been slightly altered. The change was made on account of some difficulty about securing the right of way.

The Martinez (Cal.) *Gazette* thus speaks of the new loop-line from Banta, Cal., by Antioch to Oakland: "The construction work of the Banta line is now going on in earnest from Oakland, and the road as far as Berkeley, with the branch to the University, is to be completed in the course of three or four weeks, while work on the main line, we are assured, is to be steadily continued with such force as can be advantageously employed. It is quite probable that the road will be in opera-

tion as far as San Pablo as early as July, but the heavy work at Point Conchal will consume several months with ordinary force, and we can hardly expect the iron horse along our water front before Christmas or New Year, unless it comes here from the other direction."

A petition has been presented to Congress asking for an investigation into the contracts for the construction of this road and the affairs of the Contract & Finance Company, which built the road. The petition sets forth that through the agency of that company chiefly the road was made to cost exorbitantly and that large amounts in money, lands and securities were divided among certain of the directors and were used in acquiring other railroads, steam boats, etc., to the detriment of the other stockholders. The petition also charges that the road, notwithstanding the great amount of money spent upon it, is not in good condition.

This petition and the suit mentioned above come apparently from the same parties in San Francisco, who already have several suits in progress with the company and its leading managers.

Burlington, Cedar Rapids & Minnesota.

In accordance with the decree of foreclosure granted in October last, Mr. W. M. Kaiser, of Davenport, Ia., Special Master appointed by the Court, will sell this road at public sale in Cedar Rapids, Ia., June 22. The sale will include the main line, from Burlington to Plymouth, 229 miles; the Milwaukee Division, from Cedar Rapids to Postville, 94 miles, and the Muscatine Division, from Muscatine to Riverside, 32 miles. Each division will be sold under its own first mortgage.

Pacific, of Missouri.

The St. Louis *Republican* of May 11 says: "The United States Circuit Court was occupied most of the session yesterday in considering the various claims for liens against the Atlantic & Pacific and Missouri Pacific railroads. An attempt was made to prevent the payment to the county of the $41,000 interest ordered to be paid by Judge Dillon, but Judge Treat remarked that he did not propose to reverse the orders of the circuit judge, and he ordered the money to be paid at once, and said if any cause could be shown for ordering its repayment the county was perfectly responsible.

"As to the other claims against the Pacific Railroad, Mr. Bowman, as attorney for the receivers, suggested that the pleadings were not in proper shape for any orders to be made. The court so held, and directed the filing of a copy of the master's report in the Ketchum case."

Anderson, Lebanon & St. Louis.

This road is now completed from the connection with the Cleveland, Columbus, Cincinnati & Indianapolis at Anderson, Ind., west 20 miles to Noblesville. Regular trains began to run over this section of the road May 17.

Little Rock & Fort Smith.

Work on this road is being pushed rapidly, and the tracklayers are busy near Big Mulberry. The company has had some trouble in securing a depot site at Van Buren, which may result in changing the line into that town.

Illinois Railroad Taxation.

It is said that representatives of some of the bankrupt roads of this State have been at Springfield trying to make some arrangements for delay in the collection of the back taxes, the injunctions against which are dissolved by the recent decision of the United States Supreme Court. It is represented that the roads are utterly unable to pay at present, and they ask for time. It does not appear that the State officers have any authority to make any such arrangement.

Lehigh Valley.

The City Council of Newark, N. J., has granted permission to this company to establish a large coal depot in that city and work upon the necessary sidings, trestles, etc., will be begun at once.

Albany & Susquehanna.

The new consolidated bonds, guaranteed by the Delaware & Hudson Canal Company, lessee, have been put upon the list at the New York Stock Exchange. The entire amount is $10,000,000, of which $3,450,000 are retained to provide for outstanding bonds of other issues; $1,500,000 are to be issued at once, and the rest from time to time as needed by the lessee to pay for improvements.

New York Central & Hudson River.

On May 15, this company began running 16 local trains between the Grand Central Depot in New York and Williamsbridge, over the Harlem Division, a distance of 10 miles. These trains are in addition to the other local trains heretofore run, which go to points further up the road and which also make some of the local stops south of Williamsbridge. The trains are run at convenient hours and are intended to furnish an approach to rapid transit to upper New York and lower Westchester. It is still necessary, however, to use the horse cars from the Grand Central Depot to reach the central and lower part of New York.

The stations, distances from the Grand Central Depot and fares charged on these local trains are as follows:

	Distance.	Single Fare.	100 rides.
Eighty-sixth street	2.20 miles.	$0.10	$6
One Hundred and Tenth street	3.50 "	0.10	6
Harlem	4.25 "	0.10	6
Mott Haven	5.00 "	0.10	6
Melrose	6.00 "	0.15	7
Morrisania	7.00 "	0.15	8
Central Morrisania	7.50 "	0.15	9
Tremont	8.00 "	0.15	10
Fordham	9.00 "	0.20	12
Jerome Park	10.00 "	0.25	13
Williamsbridge	11.00 "	0.30	13

The time to Williamsbridge is about 35 minutes. The number of trains will still be less and the commutation rates higher than are found on the local trains of the Erie, the Delaware, Lackawanna & Western, the Pennsylvania and the New Jersey Central out of New York. The accommodations are, however, better than those heretofore furnished on this road.

Baltimore, Philadelphia & New York.

The Pennsylvania Legislature has passed a resolution directing the Attorney General to bring a suit in the nature of a *quo warranto* to forfeit the franchises of this corporation. The company was originally known as the Juniata & State Line, and purposed building a line from Philadelphia southwest to the Maryland line, to connect with a road thence to Baltimore. There were also to be several branches. The company concluded an agreement of consolidation with the Wilmington & Reading about a year ago, which, however, has never been carried into effect.

The Floods in Northern New England.

The heavy rains of last week resulted in unusually high water in the upper Connecticut and its tributaries and in the streams flowing into Lake Champlain from the eastward, and the railroads of that section suffered considerably. The Connecticut River Valley was almost entirely under water from Northumberland to Dalton, and nearly all the bridges on the river were more or less damaged. The Boston, Concord & Montreal road was submerged for 20 miles, from South Lancaster, N. H., to Groveton Junction, and the road-bed was badly washed in several places. The Connecticut & Passumpsic Rivers road had three miles of embankment badly washed between Wells River and Newbury, Vt., and the road-bed was also badly washed further north, about St. Johnsbury and Barnet and again at Barton. The bridge at Bradford was somewhat damaged, and there was also trouble at Wells River. The Portland & Ogdensburg suffered considerably about St. Johnsbury from washing of the embankments. On the Rutland road there was much interruption from washouts at several of the river crossings, but no serious loss. On the Vermont Central there was less damage, but some delay from wash-outs near Montpelier and at White River Junction. The freshet was the greatest known for many years, and it will take some little time to repair all the damage done.

Denver & Rio Grande.

A large amount of iron is on the way to Pueblo, which is to be used in laying the track from the present terminus at El Moro, Col., south to Fort Union in New Mexico. This section is 66 miles long, and work upon it is in progress.

The Granger Cases.

The United States Supreme Court has adjourned for the term without giving a decision in any of the suits known as the Granger cases, and no decision will be announced until next Fall. As far as the Wisconsin companies are concerned, this delay will be of little moment, the law in that State having been so modified as to leave but little objection to it.

Gallipolis, McArthur & Columbus.

The right of way and partly graded road-bed of this road was offered at sheriff's sale April 29, but the sale was adjourned, no bid being made.

It has been proposed to transfer the property to the Michigan & Ohio Company, and an agreement to that effect has been made. The sheriff's sale may, however, interfere with this arrangement.

Grand Rapids, Paulding & Decatur.

A company by this name has filed articles of incorporation in Ohio. The road is to extend from Grand Rapids, O., through Paulding to the Indiana line, about 40 miles. The capital stock is to be $400,000.

Cincinnati, Reading, Sharon & Hamilton.

This company, recently organized in Ohio, purposes building a road from Cincinnati to Hamilton, 25 miles. The capital stock is to be $200,000. The road would come into direct competition with the Cincinnati, Hamilton & Dayton.

Hartford & Newington.

It is proposed to build a narrow-gauge railroad from Hartford, Conn., to Newington, passing along the west side of Cedar Mountain. It would be about five miles long, and is intended to serve the stone quarries at Newington.

Louisville, Cincinnati & Lexington.

The Receiver's monthly report for April is as follows:

Cash on hand April 1		$401,549 30
Receipts from all sources		104,790 82
Total		$506,340 12
Current pay-rolls and vouchers	$100,385 20	
Back-pay vouchers	113,551 50	
		213,936 70
Balance on hand May 1		$292,403 42

The disbursements were $109,145.88 greater than the receipts.

Louisville, Paducah & Southwestern.

Receiver Dupont's report for April is as follows:

Cash on hand April 1		$17,167 60
Receipts from all sources		35,214 62
Total		$53,382 22
Paid on pay-rolls	$23,012 34	
" " vouchers	14,760 48	
		37,772 82
Balance on hand May 1		$15,609 40

The disbursements exceeded the receipts by $1,558.20. The actual earnings of the road for March were as follows:

Passengers	$7,647 46
Freight	25,665 65
Miscellaneous	2,439 92
Total ($155 per mile)	$35,753 03
Working expenses (88.29 per cent.)	31,567 60
Net earnings ($18 per mile)	$4,185 43
Rentals paid	3,189 05
Balance for the month	$996 38

Expenses and rentals together were 97.21 per cent. of the earnings.

Marshall & Coldwater.

It is reported that work is to be resumed at once upon this road under an agreement by which the Lake Shore & Michigan Southern Company is to iron and equip the road as soon as the grading and bridging are done.

St. Paul & Dakota.

This company has been completely organized and surveys of the line have been commenced. The road is to run from the Sioux City & St. Paul road at Worthington, Minn., westward to Luverne, and is to be ultimately extended to Sioux Falls. Rock County, Minn., gives a bonus to the road. Gen. J. W. Bishop, General Manager of the St. Paul & Sioux City, is General Manager of the new road.

Sioux City & St. Paul.

This company has negotiated the sale of a tract of 40,000 acres of land, partly in Minnesota and partly in Iowa, to a party of Chicago capitalists, who intend to found a colony there.

Peoria & Rock Island.

Receiver Hilliard reports to the United States Circuit Court for March as follows:

Cash on hand March 1		$19,770 95
Receipts from all sources		35,901 42
Total		$55,672 37
Pay-rolls, car rent and other current accounts	$31,048 87	
Right of way	1,000 00	
Rock River Bridge	13,505 00	
		45,553 87
Balance on hand April 1		$10,118 50

The disbursements were $9,652.45 in excess of the receipts.

New York Central & Hudson River.

The Utica *Herald* of May 15 says: "A new arrangement for locomotives and engineers will go into effect on the Central road to-day. The nineteen locomotives now in use for passenger trains between Albany and Syracuse will be reduced to twelve. These will be run through from Albany to Buffalo. The engineers and firemen, like the conductors and brakesmen, will leave their engines at Syracuse. The engineers and firemen of the Western Division will take the locomotives from the hands of the eastern crews and run them through. The through freight engines will be used in the same way. This arrangement takes the engineers from the locomotives which they have run for years and makes them run upon all, the rule, first in, first out, prevailing at Syracuse."

It is said that this new arrangement is not liked at all by the men, who prefer to have their own engines and say that they cannot take proper care of them when they are continually shifted from one to another. The run from Albany to Buffalo, 298 miles, is a very long one, and trouble with hot journals is predicted. The new rule may be looked upon as somewhat of an experiment, and there will be some interest taken in its working.

Virginia & Truckee.

This road is now running no less than 50 daily trains. About 15,000 cords of wood per month are carried to Virginia and Gold Hill, and the ore traffic between Virginia and the mills along the Carson River is very large. There are 22 engines now in use and two more have been ordered from the Baldwin Locomotive Works.

Fond du Lac, Amboy & Peoria.

A contract for the construction of 70 miles of this road from Fond du Lac, Wis., southward has been let to D. E. Davenport & Co., of New York, who are to begin the work at once and complete it by Jan. 1, 1877.

Atlantic & Great Western.

A meeting of the bondholders was held in Liverpool, England, April 25. After listening to an address from Rev. J. Lockington Bates, one of the trustees for the reorganization of the company, a resolution was adopted urging all bondholders to deposit their securities forthwith in the hands of the trustees in order that the reorganization of the company may be efficiently and promptly carried out.

Great Western, of Canada.

At the half-yearly general meeting in London, England, April 28, the stockholders passed resolutions authorizing the board of directors to exercise the powers conferred by the Canadian acts of Parliament recently passed, or any of them which it may be necessary or advisable to use; also to issue, under the terms of that act, either perpetual debenture stock or terminable bonds, or both, to replace the money already used in buying bonds of the Wellington, Grey & Bruce and the London, Huron & Bruce under the traffic contracts with those companies, and to provide money for such further purposes as may be required by those contracts.

New York, Boston & Montreal.

The sale of the New York & Boston Division, from High Bridge to Brewster's, under the first mortgage on that section of the line, which was to have taken place May 9, has been postponed to May 25.

Gilman, Clinton & Springfield.

The committee of bondholders appointed under the agreement of July 22, 1874, gives notice that bondholders who have not joined in that agreement can do so until May 31 by depositing their bonds with Morton, Bliss & Co., of New York, and signing the agreement. The foreclosure sale of the road is to take place June 8.

Delaware Shore.

Work on this road is now making steady progress. Last week 200 tons of rails and 16,000 ties were delivered, and they are now being laid down south of Paulsboro, N. J.

Little Rock, Mississippi River & Texas.

The engineers are still at work on the location of the extension from Pine Bluff, Ark., to Little Rock. Some preliminary surveys have been made for a bridge over the Arkansas River at Little Rock.

Indianapolis Decatur & Springfield.

The Indianapolis *Journal* says: "From one of the directors of the Indianapolis, Decatur & Springfield road it is learned that a force of six hundred men is employed grading the line between Montezuma and the point it will cross the Logansport, Crawfordsville & Southwestern road, and a large engineer corps is engaged in making surveys east of that point. The financial condition of the company is such as to insure the completion of the road to Indianapolis before another year."

Wyandotte, Kansas City & Northwestern.

The track is now laid to Wellington, Mo., 34 miles eastward from Kansas City and 11 miles beyond the late terminus at Buckner Hill. Work is being pushed on the 10 miles between Wellington and Lexington. The road being completed to the coal mines of Lafayette County, the remaining $75,000 Kaw township bonds have been delivered to the company according to contract.

Nebraska.

About $90,000 have been secured towards the amount needed to extend the road from Nebraska City, Neb., northward to Plattsmouth. This leaves $28,000 in subscriptions yet to be secured to insure the completion of the grading and bridging. It is said that arrangements have been made to place bonds enough to pay for the iron, if the rest of the work can be done and paid for.

Delaware, Lackawanna & Western.

A survey is now being made for a short line to connect the Utica Division at or near Earlville, N. Y., with the Utica, Clinton & Binghamton road at or near Smith's Valley. The latter road is now also worked by this company, and, with the proposed connection, will make a line from Earlville to Utica some five miles shorter than that of the Utica Division.

The condition of the Utica, Clinton & Binghamton road has been very much improved since it was given up by the Midland. A large number of new ties and rails have been laid, and the road otherwise put in better order.

On the Utica Division the standard gauge rails have been laid for 16 miles, being put down inside the present six-feet gauge rails. Other preparations for the change of gauge are being hurried forward. It is said that the change will probably be made May 27.

Greenville, Columbus & Birmingham.

This company was organized several years ago for the purpose of building a railroad some 250 miles long, from the Mississippi River at Greenville, Miss., nearly due east through Winona and Columbus to Birmingham, Ala. Some county subscriptions were secured in 1872 and 1873 and some grading done near Winona. Lately the project has been revived and an effort is to be made to complete the road from Winona, which is on the New Orleans, St. Louis & Chicago road, east to Columbus. When that is done, the section from Columbus to Birmingham will receive attention, that from Greenville to Winona being left until all the rest is finished.

Southern Pacific.

A telegram to a San Francisco paper dated Seven Palms, Cal., May 6, says:

"This present terminus of the Southern Pacific Railroad, 120 miles from Los Angeles, has become quite an important transfer point for Arizona. We are situated right on the Colorado Desert. The track is completed ten miles east, leaving only a small gap of eleven miles to Indian Wells, a point we expect to reach by the last of the present month. This will probably be the shipping point for the Bear Valley and Ivanpah mines. Several parties have lately located claims, with a good prospect and high assays, some 25 miles northeast of here, and will ship 30 or 40 tons of ore to San Francisco for practical test as soon as their road is completed. The freighting to Arizona increases as we near the river. Every teamster wears a broad smile of satisfaction as he returns each time to find the distance ma-

terially lessened. Two stages start from here, the Arizona and New Mexico express stage leaving every alternate day, and the Colorado and Arizona stage making weekly trips."

United States Rolling Stock Co.

This company last week leased to different roads 50 cars and eight locomotives, showing some increase in the demand for equipment. The Receiver of the Indianapolis, Bloomington & Western road has been authorized to contract for 10 locomotives.

Atlantic, Mississippi & Ohio.

The application for a receiver came up before the United States Circuit Court at Richmond, Va., May 2, when counsel asked for a further postponement on the ground that Mr. Collinson, agent for the foreign bondholders, had only arrived the day before and wanted a little time to look into the case. After some discussion the hearing was postponed to June 1.

Montclair & Greenwood Lake.

The long, deep cut at Kearney, N. J., where there has been much trouble from slides, is being widened and cleared out by the Delaware, Lackawanna & Western Company, which is using the material taken out for filling in the approaches to its new tunnel through Bergen Hill. The arrangement is mutually satisfactory, one company getting the material which it wants, while the other has a much-needed improvement made at trifling cost to itself, being called upon only to give the use of an engine.

Selma, Marion & Memphis.

In the United States Circuit Court at Memphis, Tenn., May 13, the application of the creditors was granted and A. A. Coleman appointed Receiver.

Portsmouth & Dover.

A special meeting of the stockholders was held in Portsmouth, N. H., May 15, to consider the question of providing for the floating debt of the company, which amounts to $85,025.95. A committee of five was appointed to prepare a plan and submit it to a future meeting. The road is about 12 miles long and is leased to the Eastern Railroad Company.

Ohio & Kentucky.

The foreclosure sale of the property of the Ohio & Kentucky Coal, Iron & Railroad Company, which was to take place April 20, has been adjourned to May 20. The property is situated in Lewis, Carter and Greenup counties, in Kentucky, and includes some large tracts of coal and iron lands, with about 30 miles of railroad built to serve the mining properties, and extending from Sandburg, Ky., to Boone Furnace.

Kent County.

At the recent annual meeting an attempt was made to change the board of directors, the object being to displace Mr. Gerker, now lessee of the road, and to lease it to a Mr. Aikin. The attempt failed and the old board was re-elected.

Fort Scott, Winfield & Western.

This company was recently organized in Kansas to build a railroad from Fort Scott, Kan., westward to a junction with the Atchison, Topeka & Santa Fe.

Arkansas Valley.

This company has been organized for the purpose of building a railroad from Fort Smith, Ark., up the Arkansas River through the Indian Territory into Kansas, passing through Wichita and Hutchinson, and thence to the Kansas Pacific at Ellsworth.

Manchester & Keene.

Chief Engineer George is now making the final location. The contractors were to begin work near Greenfield, N. H., this week.

Utah Northern.

A force of 50 men is at work on the tunnel 15 miles north of Franklin, Idaho, and the contractor promises to have it done by July 1. The superstructure of the Bear River bridge is finished and has been shipped from Chicago.

Paducah & Memphis.

A telegram from Memphis, Tenn., says that the United States Circuit Court has granted a decree of foreclosure and sale of this road. This, it is said, will remove all obstacles to the reorganization of the company and the completion of the road.

The round-house at Paducah, Ky., was burned on the morning of May 14. Four engines which were in the house were badly damaged, and the loss is estimated at $15,000.

Train Accidents in April.

On the 1st, two cars of a train on the Decorah Branch of the Chicago, Milwaukee & St. Paul road were thrown from the track near Decorah, Ia., by the spreading of the rails. One of the cars, a passenger coach, upset in the ditch and was badly broken, injuring six passengers badly and several slightly.

On the night of the 1st, a freight train on the Utica, Clinton & Binghamton road ran off the track in Utica, N. Y.

On the morning of the 3d, three freight cars on the Utica & Black River road were started on a down grade at Watertown, N. Y., and ran down the siding, taking two others with them, until they struck an open switch and went into the ditch.

On the afternoon of the 3d, a mixed train on the Grand Rapids & Indiana road was thrown from the track by a loose rail near Morley, Mich. Two freight and three passenger cars were badly wrecked, injuring two trainmen badly and 12 passengers less severely.

On the 4th, a train on the Fonda, Johnstown & Gloversville road ran off the track near Fonda, N. Y., and one man was slightly hurt.

Late on the evening of the 4th, near New Cambria, Mo., on the Hannibal & St. Joseph road, a freight train ran off the track, piling up several cars and delaying trains seven or eight hours. The cause is supposed to have been a broken truck.

On the morning of the 5th two cars of a passenger train on the Selma, Rome & Dalton road were thrown from the track near Calera, Ala., by a brake-shoe which had dropped upon the track. A brakeman was thrown from one of the cars against a rock and fatally hurt.

On the 5th a passenger train on the Baltimore & Ohio road ran into a land-slide near Fredericktown, O., breaking the engine and two cars badly and injuring the fireman.

On the afternoon of the 5th an express train on the New York Division of the Pennsylvania Railroad ran into the rear of a construction train near Holmesburg Junction, Pa. The express engine was badly broken and several construction cars wrecked.

On the morning of the 7th, as a construction train on the Chicago, Burlington & Quincy road was near Woodburn, Ia., the engine running backwards, the tender jumped the track, dragging the engine after it, and the whole train—eight cars—was piled up on top of them. The engineman and fireman were badly hurt and a brakeman killed.

Near noon on the 7th, on the Toledo, Peoria & Warsaw track, near Peoria, Ill., there was a butting collision between a Toledo, Peoria & Warsaw and an Illinois Midland freight train. The Midland engine mounted upon top of the other and both were badly damaged. The Toledo, Peoria & Warsaw train had received orders to run to the first siding and meet the other train, but failed to reach it in time.

On the afternoon of the 7th a passenger train on the Cleveland, Tuscarawas Valley & Wheeling road ran over a misplaced switch and into the head of a coal train which was standing on a siding at Elyria, O. Both engines were badly damaged.

On the evening of the 7th a local train on the New York Division of the Pennsylvania Railroad was thrown from the track near Harrowgate, Pa., by a switch which had been purposely misplaced. The engine upset and was completely wrecked; the baggage car upset and the passenger car was thrown from the track and badly broken. The engineman, fireman and four passengers were hurt.

On the morning of the 8th a car of a freight train on the Kansas Central road ran off the track and upset near the depot in Leavenworth, Kan.

On the 8th a train on the Connecticut Central road was thrown from the track at East Windsor, Conn., by sand which had been blown upon the track by a high wind.

On the evening of the 8th a car of a milk train on the New Jersey Midland road ran off the track near Smith Mills, N. J., and was slightly damaged.

Late on the night of the 9th an express train on the Lehigh Valley Railroad struck a rock which had rolled upon the track in a side hill cutting at Barn Door, three miles from Penn Haven Junction, Pa. The engine was thrown up against the bank, while the baggage, smoking and one passenger car went off on the other side and rolled down into the river. One passenger and four employes of the road, who were on the train, were hurt, and the track was blocked six hours. The engine and cars, however, were not badly damaged.

On the morning of the 11th a freight train on the Southwestern Division of the Chicago, Rock Island & Pacific ran into some cars which had been blown out of a siding at Allerton, Ia., in a storm. The engine and several cars were badly broken during a and the engineman slightly hurt.

On the afternoon of the 11th several cars of a mixed train on the New York & Oswego Midland road were thrown from the track near Moreston, N. Y., by the breaking of an an axle under a freight car. The track was blocked four hours.

On the night of the 12th the engine of a freight train on the Cincinnati, Sandusky & Cleveland road was thrown from the track near Tiffin, O.

Very early on the morning of the 13th a coal train on the Hawley Branch of the Erie struck a rock which had rolled upon the track near Rowland's, Pa., wrecking the engine and three cars.

On the morning of the 13th the engine of the fast mail train on the New York Central & Hudson River struck a tie which had been wedged in a cattle guard by some person unknown, and the engine was so damaged as to be unable to proceed, although it did not leave the track.

Early on the morning of the 14th a car in a freight train on the Erie Railway ran off the track at Sterling Junction, N. Y., blocking the west-bound track seven hours.

On the 14th, as a train on the Northern Railroad was passing through Andover, N. H., a large boulder rolled upon the track, throwing a freight car into the ditch.

On the 14th, about 1 a. m., as the second section of a through freight east was passing through Patapsco Narrows, Md., on the Western Maryland road, the flange of one of the wheels of a freight car gave way, causing that and two other cars to leave the track and pile up in bridge No. 34, making an almost inextricable tangle, which blocked the road for several hours and made the transfer of passengers necessary. The bridge was only damaged to the extent of one broken floor-beam. The track, having been just relaid with new ties and rails, was very strong and sustained no damage.

On the 14th, the flue sheet of an engine on the Cambridge City Branch of the Jeffersonville, Madison & Indianapolis road collapsed when the train was near Cambridge City, Ind. The fireman and a brakeman were badly scalded.

About 6 o'clock on the evening of the 14th, near Bluffs, Ill., on the Toledo, Wabash & Western road, a passenger train went into the ditch, injuring the fireman slightly. The accident was caused by a broken flange on one of the engine wheels. The road was blocked eight hours.

On the evening of the 14th, an express train on the Concord road ran into a land-slide near Suncook, N. H., and was thrown from the track.

Very early on the morning of the 16th, a freight train on the Texas & Pacific road ran off the track near Coldwater, Tex., blocking the road half a day.

On the morning of the 17th, a mixed train on the Connecticut Valley road was thrown from the track near Hartford, Conn., by the giving way of an embankment which had been badly washed by a freshet in the Connecticut River. The engine and four cars passed over, but eight cars went into the gap and were badly broken.

On the night of the 17th, at Galva, Ill., on the Chicago, Burlington & Quincy road, a west-bound freight ran into the head of an east-bound train which was just pulling out of a siding, damaging both engines and four cars. It is said that the engineman of the east-bound train had been asleep and, waking suddenly, thought that the other train had passed and started out. The engineman was slightly hurt.

On the night of the 18th six cars of a freight train on the Concord Railroad were thrown from the track between Merrimack and Reed's Ferry, N. H., by the breaking of a journal under one of them.

On the morning of the 19th, on the Missouri, Iowa & Nebraska road near Cahoka, Mo., an express car on a passenger train was thrown from the track by the breaking of one of the trucks.

On the morning of the 19th a freight train on the Lake Shore & Michigan Southern Railway was thrown from the track by a misplaced switch in Dunkirk, N. Y. The engine went into the ditch and upset and nine cars were piled up on top of it and badly wrecked. The fireman was somewhat hurt.

On the night of the 19th a train on the Rensselaer & Saratoga road was thrown from the track near Saratoga, N. Y., by a switch which had been purposely misplaced.

Very early on the morning of the 20th five cars of a freight train on the Chicago, Danville & Vincennes road were thrown from the track and badly wrecked near Grant, Ill. A man who was stealing a ride between two cars was killed.

Very early on the morning of the 20th a train on the Atlantic & Great Western road struck a steer which had got upon the track and was stuck fast in a cattle guard near Buckfooth, N. Y. The engine, baggage car and smoking car were thrown from the track, blocking the road seven hours.

On the morning of the 20th, as a mixed train on the Transcontinental Division of the Texas & Pacific road was passing over a trestle bridge near Bonham, Tex., the engine and three cars left the track and the cars fell to the ground, wrecking themselves, breaking four bents of the trestle and injuring a brakeman fatally.

On the morning of the 20th the engine of a west-bound freight train on the Erie Railway was thrown from the track at Monroe, N. Y., by a misplaced switch.

On the afternoon of the 20th a north-bound freight train on the Mobile & Ohio road ran over a wooden cattle guard which had caught fire in some way. The engine and three cars went over, but the fourth car broke through and several following cars were thrown from the track. The wreck caught fire and 14 cars were burned up.

On the morning of the 22d, a train on the Missisquoi Railroad ran off the track near Sheldon, Vt., delaying the train half an hour. The track is said to be in very bad order.

About noon on the 22d, at Versailles, Ill., on the Toledo, Wabash & Western Railway, an extra stock train ran into the rear of a preceding freight, throwing three cars into the ditch and disabling the stock engine. The supposed cause was want of caution on the part of the stock-train crew and neglect of the freight crew to put out proper signals.

Very early on the morning of the 23d, as a freight train in three sections was going east on the New York Central & Hudson River, the first section stopped at Palmyra, N. Y., to switch a car. The second section stopped also, when the third came up and ran into the rear of the second, driving it upon the first and damaging two engines and a number of cars. The morning was foggy, and the track very wet and slippery.

On the night of the 24th, a freight train on the Canada Southern road went into the open draw of the bridge over the Welland Canal, at Welland, Ont. The engine, tender and five cars went into the canal and were completely wrecked, killing the engineman and a brakeman. The bridge-tender claims that the proper signals were displayed.

Late on the night of the 24th, the engine and baggage car of a train on the Atlanta & Richmond Air Line were thrown from the track by a misplaced switch at Seneca City, S. C., injuring them and blocking the road four hours.

Very early on the morning of the 25th two cars of a freight train on the Erie Railway were thrown from the track by a broken wheel near Port Jervis, N. Y., and the 12 rear cars of the train were damaged by striking against the wreck. A tramp who was stealing a ride was hurt.

On the morning of the 25th the rear car of a train on the New Jersey & New York road ran off the track near Hackensack, N. J., and went down a bank, injuring two passengers. The accident was caused by a broken rail.

On the afternoon of the 25th the engine of a train on the Portland & Ogdensburg road ran off the track at Lunenburg, Vt., and was somewhat damaged.

On the 26th a train on the Missisquoi Railroad ran off the track near Richford, Vt.

The train was got on again, but afterwards ran off a second time near St. Albans, Vt. The track is said to be in miserable condition.

On the afternoon of the 26th, as a coal train on the Delaware, Lackawanna & Western road was being run upon a siding at Oswego, N. Y., the brakes failed to hold it, and it ran into and wrecked some standing coal cars.

On the afternoon of the 26th a south-bound freight train on the Galveston, Harrisburg & San Antonio road ran over a misplaced switch and into the head of a construction train which was standing on a siding at Harrisburg, Tex. Both engines were badly broken and a brakeman hurt.

Late on the night of the 27th a car of a freight train on the Pennsylvania Railroad ran off the track in Elizabeth, N. J, and was badly broken.

Late on the night of the 29th a train on the Jackson, Lansing & Saginaw road struck some ties which had been put upon the track near St. Charles, Mich. The engine, tender and baggage car were thrown from the track and badly broken.

On the morning of the 30th a freight train on the Missouri, Kansas & Texas road ran into a washed out culvert near Great Ridge, Mo., and the engine and 12 cars were piled up together in a very bad wreck. Two trainmen were badly hurt and a lot of stock killed.

Late on the night of the 30th a freight train on the Erie Railway was thrown from the track by a misplaced switch near the head of the yards in Jersey City. The switch had been purposely misplaced and the signal light twisted round so as to show the usual safety signal, although the switch was wrong.

This is a total of 56 accidents, whereby six persons were killed and 47 injured. Five accidents caused the death of one or more persons, 15 caused injury but not death, while 36, or 64.3 per cent. of the whole number caused no injury serious enough for record.

These accidents may be classified as to their nature and causes as follows:

COLLISIONS:		
Rear collisions	5	
Butting collisions	4	
		— 9
DERAILMENTS:		
Unexplained	13	
Misplaced switch	7	
Accidental obstruction	5	
Bad track	3	
Broken wheel	3	
Broken axle	2	
Broken truck	2	
Wash-out	2	
Land-slide	2	
Spread or loose rail	2	
Cattle on track	1	
Burned cattle-guard	1	
Open draw	1	
Malicious obstruction	1	
		— 45
Collapsed flue sheet		1
Malicious obstruction, causing damage, but not derailment		1
Total		56

Two collisions were caused by misplaced switches, one by cars blown out of siding, one by failure of brakes and one by neglect to use signals, or as a correspondent forcibly puts it in sending an account of the accident "d—d carelessness." An open draw accident was also probably caused by neglect to use signals, though this cannot be certainly known, as the engineman and fireman, who should know, were both killed. Sixteen accidents were caused by defect or failure of road or equipment. As compared with April, 1875, there is a decrease of four accidents; of three in the number killed, and of 20 in that injured.

The number of accidents is small, only one month in the past year having shown fewer, and there has been no particular reason for this in the weather, or otherwise. The month cannot be said to have presented any marked features; the number of misplaced switches is large, nine in all, and three of these are said to have been purposely set wrong. Three accidents, all on one road and within a few days, are charged directly to bad track; possibly several of the unexplained derailments are due to the same cause. The number of collisions is somewhat below the average.

For the year ending with April the record is as follows:

	No. of accidents.	Killed.	Injured.
May	54	6	43
June	61	23	67
July	73	33	50
August	114	27	110
September	116	50	102
October	88	12	74
November	87	24	57
December	84	13	62
January	60	8	39
February	91	15	68
March	109	30	93
April	86	6	47
Totals	993	245	934

The averages per day for the month were 1.87 accidents, 0.20 killed and 1.57 injured; for the year, 2.71 accidents, 0.67 killed and 2.52 injured. The averages for the month are considerably below the averages for the year.